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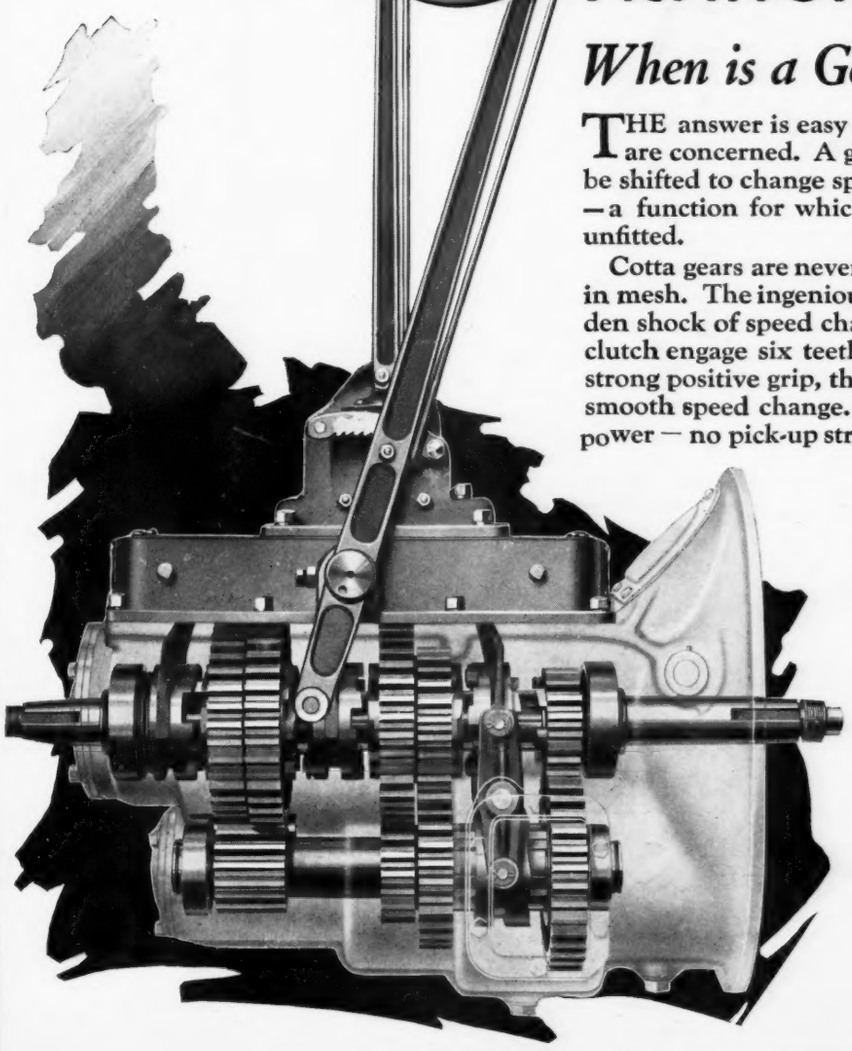

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AUTOMOTIVE INDUSTRIES
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VOL. XLIII NEW YORK—THURSDAY, AUGUST 12, 1920 No. 7

Commercial Development Rules Olympia Aero Show

Dropping of the military rush and the sure development of commercial types are demonstrated. The all-metal machine and the amphibian plane show the beginnings of new lines of advance. The engine section was an equally interesting exhibition.

THE Sixth International Aero Show at Olympia, July 9 to 20, London, is significant in many respects. It represents the emergence of the British Aircraft Industry (in spite of its title the exhibition is almost purely national in character) from the state of war prosperity which it so long enjoyed, and indicates very clearly how it proposes to deal with the hard problems of peace-time aeronautics, with keen competition for such orders from home and abroad that may be going and with an entire absence of direct Government support by subsidy.

Several features distinguish this Aero Show very strongly, and not the least of these is the fact that although many of the machines have a quasi-military appearance they are all, without exception, definitely civil types in which very big strides in efficiency have been made. For far and away the busiest period of its life the industry has had perforce to handicap its designs with a somewhat ponderous "military load," and it has now had the welcome opportunity of showing what it can do with, as it were, a few hundred pounds weight in hand. It is not surprising to find, therefore, that British airplanes are immensely improved in general performance, in quick get-off, rapidity of climb, fuel economy, and above all in wide speed latitude. The importance of this last point cannot be over-estimated, for upon it alone very largely depends the patronage which the newest transport will receive from the general public. The latter is very properly being courted by a demonstration that air travel is conducted in the greatest possible degree of personal comfort, but it is still somewhat suspicious of danger, and although it realizes well enough the advantages of terrific speeds when once a machine is in the air, it nevertheless cannot fail to be even more impressed with landing speeds comparable to the pace of an ordinary motor car.

There are, of course, innumerable examples of single seater airplanes suitable to be "flown by owner," but the passenger carrier is easily the predominant type at Olympia. From this one judges that the manufacturers expect to sell aircraft not so much to the private user as to the operating company, and there is no doubt that this view is sound. Accordingly, comfort for the passengers is a feature which has received very great attention and the contrast between the type of machine exhibited to-day and that which featured at the last Olympia Aero Show is extraordinary. The modern air traveler is certainly not expected to dress the part; he need not trouble about leather overcoats, flying helmets, or goggles, for enclosed cabins with electrically heated carpets and radiators make an ordinary lounge suit quite appropriate for three hundred miles at 10,000 feet altitude.

All things considered the number of firms exhibiting at Olympia is comparatively small, and several

well-known names—in particular that of Airco, which was so long associated with the "De H" designs—are on the list of absentees. That, however, is only natural when one bears in mind the fact that many prominent firms began their association with aircraft after the outbreak of war and remained in the industry only so long as contracting work was to be had. The real pioneers, or at all events nearly all of them, are still very much in existence.

Although aerodynamic progress continues to be made, one cannot see anything in the show which indicates any revolutionary changes in principle. The Handley-Page double-lift wing is apparently still too "hush-hush" to be shown, although one believes that it has been well proved experimentally. The dominant impression which one receives is rather that aeroplanes have been made thoroughly practical and that for the near future development is to be looked for not in design but simply in application.

From a spectacular point of view the show is unavoidably disappointing. The building is big enough to hold the industry, it is true, but there is too much disparity in the size of the exhibits to enable one to get a good perspective, and the small aeroplane is necessarily hopelessly dwarfed by being put under the shadow of the wings of the giant aerial liner.

Airplanes

From the public's point of view the *clou* of the whole show is the immense Bristol triplane, which towers above and beyond everything else, and is equally impressive within and without. This machine has 400 hp. Liberty engines, with four screws, two pushers and two tractors. The fuselage is divided into two passenger compartments fitted up in the most elaborate style, whilst in front the pilot and his mechanic occupy a glazed cabin reminiscent of a railway signal box with its complexity of controls. In the normal way the pilot is solely concerned with the airplane controls, those of the engines being attended to by the mechanic. At full throttle the machine has a speed of 134 miles an hour, cruising at 100 mph. with all four engines at a little more than half load. Fully loaded she can maintain altitude with the two front engines out of action. The range is 600 miles; the wing span is 81 ft. 8 in., chord 8 ft. 6 in., length 52 ft., height 20 ft., surface 1905 sq. ft. and weight 17,750 lb.

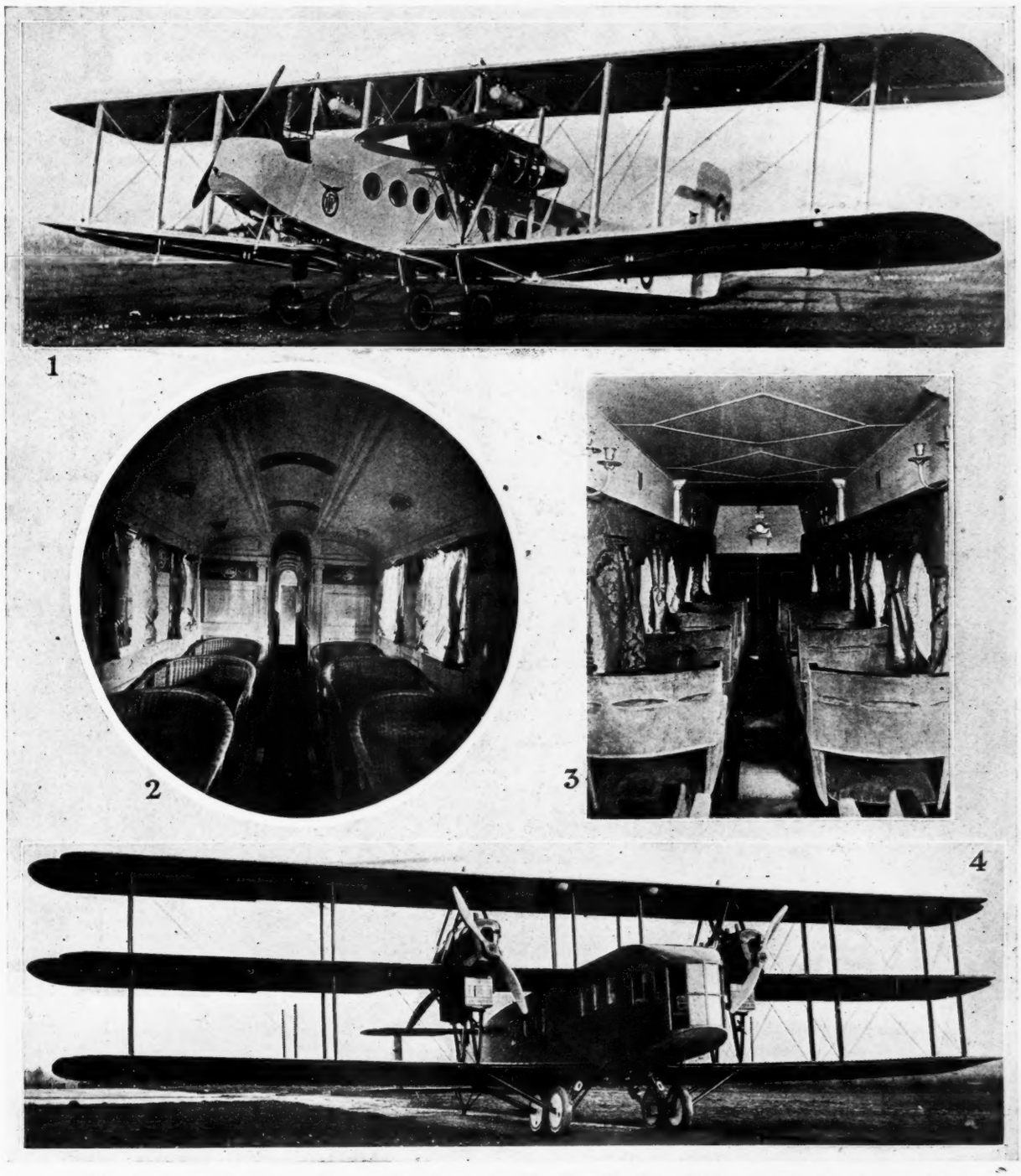
Another Bristol machine of interest is the coupé, a peace edition of the famous fighter with a peculiarly humped two-seated cabin, the roof of which hinges back to give the passengers ingress. This is a good example of transmogrified military design, a type which quite naturally finds the greatest favor with manufacturers.

The next biggest machine to the Bristol Pullman is the Handley-Page twin-engined passenger carrier, a new type that has been developed since the war. The two tractors are driven by 450 hp. twelve cylinder Napier "Lion" engines, and the principal dimensions of the machines are as follows: Span 75 ft., chord 10 ft., length 60 ft., surface 1500 sq. ft. This is the airplane which recently established a British height record by flying for over an hour at 14,000 ft. with a load of over 1½ tons, equivalent to 26 passengers. In this design the wings are of equal span, the upper plane being flat whilst the lower has a pronounced dihedral. The "power eggs" are cigar shaped and supported midway between the planes. The under-carriage is of the four-wheeled type, all the wheels being in line, in contradistinction to the under-carriage of the Bristol in which there are two axles, one behind the other. The pilot sits in an open cockpit in the nose of the rectangular fuselage and from that point rearwardly the hull consists of a single saloon, lit by a row of circular portholes and providing accommodation for fifteen passengers. The machine contains two interesting technical features. Firstly, the tail is a monoplane, whereas the older Handley-Page twin and four engine designs had biplane tails, and secondly the ailerons are balanced by being hinged well behind their leading edges.

Another fifteen seater is the Vickers-Vimy Commercial, a direct development of the Transatlantic machine. Equipped with two Eagle VIII 375 hp. Rolls-Royce engines, her speed is 110 mph. near the ground and 100 mph. at 10,000 ft., with a climb of 6000 ft. in 17 minutes. Landing speed is 45 mph. and flying speed with one engine only 70 mph. The outstanding feature of the Vimy design is the elliptical section "monococque" fuselage, which is very deep and terminates in a smoothly rounded nose, immediately behind which is the pilot's open cockpit. The fuselage is built up on a system of hollow box-section wooden rings and covered with plywood, except for the portion between the cabin and the biplane tail, which is covered with fabric. This construction appears to be eminently satisfactory both from the point of view of mechanical strength and of interior roominess.

The most interesting Vickers exhibit, however, is undoubtedly the "Viking," an entirely new design of amphibian aeroplane with a number of very striking features. Briefly described, it is a flying boat with a two-step hydroplane hull fitted with an adjustable wheeled under-carriage. The hull is made of Consuta material, which consists of plies of wood cemented together and afterwards sewn. The wheeled under-carriage is mounted level with the front "step" and consists of two independent wheels, with enclosed shock absorber gear, attached by arms to a bar which goes right across the hull. On the outside of the latter, at each side, is a quadrant of brass provided with a row of semi-spherical holes forming a rack. In these holes engage the "knobs" of a pinion, which rides up and down the quadrant, carrying with it the landing wheel and its arm. This movement is controlled by a wheel in the pilot's cockpit, enabling each landing wheel to be let down easily and independently when the aeroplane is in the water. This arrangement very greatly simplifies the handling of the machine, allowing it to be run down to the water and climb out under its own power; herein it is, perhaps, more useful than in its function of permitting the "Viking" to land direct upon the ground. The pilot and front passenger sit in a forward cabin with a glazed roof, a third person being carried in a rear cockpit just abaft of the four-bladed screw. This latter is particularly noticeable in that it is of a diameter much smaller than that generally associated with a 375 hp. Eagle Rolls-Royce engine. The blades are, however, very wide and large in area, the idea being to keep the power egg, which is situated immediately below the center of the upper plane, as low down as possible and close to the hull. The tail is a biplane. Canoe shaped sewn plywood floats are fitted to the wing tips and the hull is provided with a small tail-skid. The dimensions of this strikingly original amphibian are briefly: Span, 46 ft.; chord, 6 ft.; length, 32 ft.; height, 13 ft.; surface, 550 sq. ft.; weight (loaded) 4545 lb. Although this design is frankly experimental the trials of this machine have been highly successful and satisfactory.

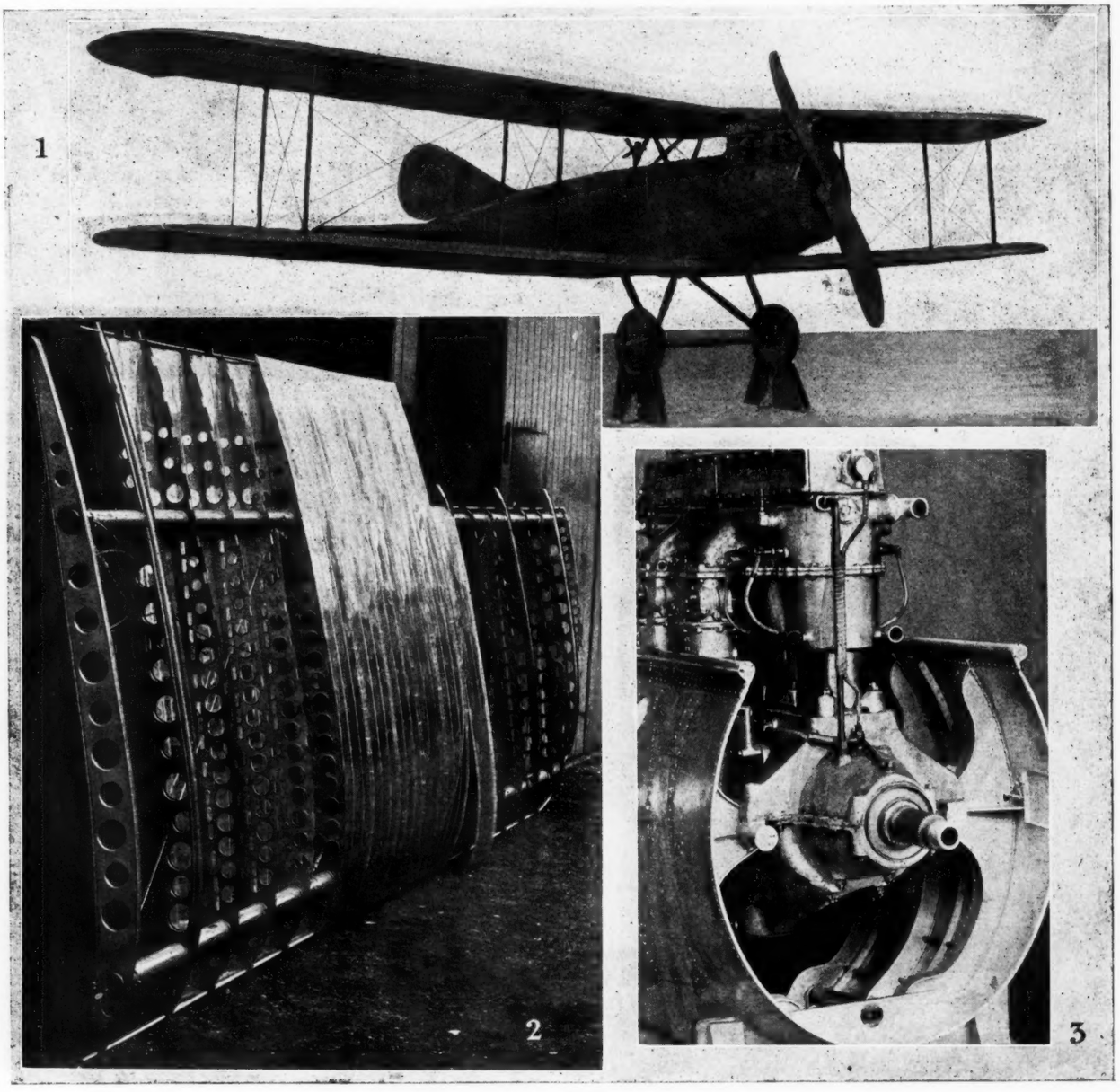
A type of airplane which is well represented at the Olympia Show is the medium-sized single-engine passenger carrier, with side entrance limousine cabin, as opposed to the lighter type of machine, which is only fitted with a covered-in passenger cockpit. In this class come the Sopwith "Antelope," the BAT Commercial Mark I, and the Westland. The first named is a very highly de-



The large passenger carriers at the show. 1—*The Handley-Page W-8.* 2—*The interior of the Bristol.* 3—*The cabin of the Handley-Page.* 4—*The Bristol "Pullman" triplane*

veloped modern design with an extremely wide speed latitude. With a maximum speed of over 100 mph., the landing speed is only 35 mph., the engine being a 180 hp. Hispano Suiza. This airplane is fitted with an engine starting device operated from the pilot's seat. The latter is in front of the passengers' cabin, which is ingeniously contrived to enable one of the two passengers to sit in the open should he so desire. For this purpose a sliding panel in the "deck" covers up an aperture with comfortably upholstered edges. The rear cabin seat is adjustable and in its upper setting gives the passenger much the same position as he would have in a military reconnaissance machine. Two other Sopwith types are the "Gnu," a light high-performance two-passenger machine with open or enclosed passenger accommodation, and the "Dove," an open single or two seater, which closely follows the lines of the famous "Pup."

In regard to the disposition of the personnel, the BAT Commercial is somewhat unusual in that the pilot's cockpit is placed to the rear of the central cabin, and is, in point of fact, quite close up to the tail. Another characteristic feature is the landing chassis in which the combination of Oleo shock absorber and elastic suspension is carried well away from the ground, at the side of the fuselage instead of upon the under-carriage axle itself. The BAT "Bantam" is an extremely high-perform-

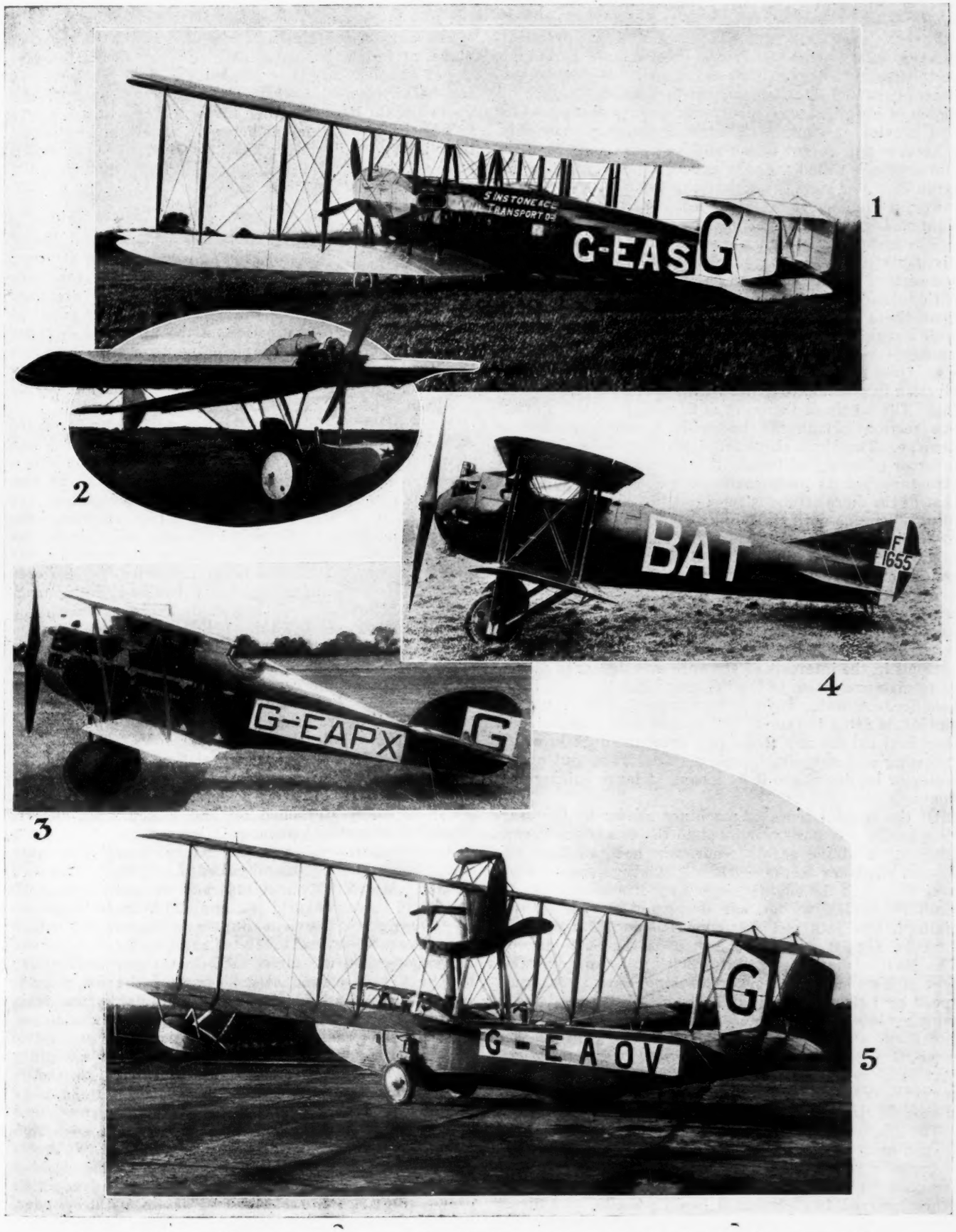


1—The Short all-metal "Swallow," showing the general outline. 2—One of the wings partially covered, showing the method of fastening the covering. 3—The "Puma" engine in place

ance single seater scout with monococque fuselage, the cockpit being so arranged that the pilot's head projects through a circular hole in the top plane. The engine is a 200 hp. stationary radial A.B.C. giving a speed of 146 mph. at 10,000 ft. and a climb of 18,000 ft. in 18 minutes. Here, again, the under-carriage is quite out of the ordinary, the wheels being set wide apart and each working independently in a vertical slide arrangement, without any common axle. The BAT Crow, or "flying sidecar," is distinguished by being at once the smallest machine in the show and also the only monoplane represented. It has a 40 hp. twin cylinder engine and is quite the limit in simplicity of construction. It can be dismantled for storage purposes in a few minutes. With a landing speed of 30 mph., a maximum speed of 65 mph. and an endurance of 150 miles, the "Crow" is 19 ft. span and has a total lift area of 76 sq. ft. Empty it weighs but 225 lb. It has no fuselage, the tail being carried in a pair of booms, and the pilot sitting in a small car immediately over the under-carriage axle.

Another very interesting small machine is the Austin "Whippet," made by the Austin Motor Co. This is also primarily designed for cheapness, but is upon altogether more orthodox lines. Intended to demand the minimum of attention, it has no wire bracing whatever, the whole of the fuselage and wing bracing being of steel tube. The rest of the wing construction is of wood. The wings fold back parallel with the fuselage so that the machine could be kept in an ordinary motor garage, the folding operation taking only about one minute. The range of speed, with a 50 hp. stationary radial Anzani engine, is from 90 to 35 mph., and it is capable of getting into the air out of a very small field indeed. This machine and the BAT are the only attempts to make a machine that can be entirely looked after by a pilot whose technical skill is limited to keeping the engine running, and ultimately there is every reason to believe that these simple airplanes will attain quite a vogue.

An airplane which has attracted very considerable attention is the Short "Swallow" with its all-metal Dura-



1—The Vickers "Vimy-Commercial" in service between London and Paris. 2—The BAT "Crow," the smallest machine exhibited. 3—The Martinsyde "Semi-Quaver," the fastest machine shown. 4—The BAT "Bantam." 5—The Vickers "Viking," the only amphibian shown

lumin construction. It contains no wood or fabric at all, the wings and fuselage being covered with Duralumin sheet. The appearance of the machine, polished all over, is very striking. It is to be noted that practically every part is stamped out of sheet metal, the engine, for instance, being carried on a series of box section bearers trussed by longitudinal steel tubes. The fuselage is of elliptical section, strengthened with bulkheads, and provides accommodation for a single person only. Wherever holes occur in the hull a strengthening ring of Duralumin is rolled over the edges. The wing spars are large diameter steel tubes carrying Duralumin ribs. The latter in their sheet are stiffened and at the same time lightened with a series of holes with swaged edges.

The manner in which the wing surface is applied is distinctly novel. The ribs themselves are deeper than the section of the wing and their edges are serrated by little turned-down flaps, first one way and then the other; upon these flaps rests a strip of Duralumin sheet, just wide enough to go between each rib and with its turned-up edges butting against the projecting portions of the rib. Over this joint passes a U section strip, which is rivetted in position together with the rib flaps and sheeting. The whole of the wing is thus divided into numerous sections which can be easily repaired in case of damage. The Short all-metal airplane is claimed to have a factor of safety of twenty throughout the whole of its structure, yet its performance is quite comparable with that of the more orthodox type. With a 230 bhp. Siddeley "Puma" engine with six cylinders, the maximum speed is 120 mph. and the range at cruising speed 450 miles. The climb is 10,000 ft. in 11 minutes, surface 370 sq. ft., weight empty 1875 lb. and total weight 2870 lb.

Another Short machine is a sporting seaplane, four seater, with two main floats. It is also adaptable for cargo carrying and has folding wings. A novelty is the construction of the floats, which have concave curved bottoms in the interests of strength and lightness as well as to give protection to the bottoms when the machine is beached. A water rudder, interconnected with the air rudder, is fitted to the subsidiary tail float. Included in the Short exhibit is a model of a seaplane dock in which incoming and outgoing seaplanes are drawn out of the water or let down into it by means of large submersible floats.

Of the several types of machines shown by the Martinsyde Co. the most prominent to the eye is the "Semi-Quaver," a single seater scout, which is amongst the fastest airplanes in the world. The wings span a little over 20 ft. and the engine is a 300 hp. Hispano-Suiza. A similar machine, though one somewhat less highly specialized, has been officially timed to do 161 mph., and an even higher speed is expected of the Semi-Quaver. The Martinsyde F4 two seater 300 hp. is an admirable type of high speed passenger machine, with a maximum speed of 142 mph., a landing speed of 40 mph., and a cruising speed of 115 mph.; it has a wing span of 32 ft. and a surface loading of 7 lb. per sq. ft. Still another model is the Type A, a limousine cabin passenger transport machine, made also as a seaplane; its span is 43 ft., cruising speed 100 mph., and it is fitted with a 300 hp. Hispano-Suiza engine.

The Supermarine is a true flying boat with a cigar-shaped monococque hull provided with two "steps," and is made in single seater or four seater type. The construction of the hull, by means of diagonal planking, fabric covered. is such that it is quite elastic to a direct blow and therefore practically unbreakable, whilst being enormously stiff in the torsional and bending senses. The main planes fold up forwards and are made completely separate from the power plant, which is carried high up above the hull. To counteract the high thrust the upper plane of the biplane tail has an inverted camber and gives a negative effect.

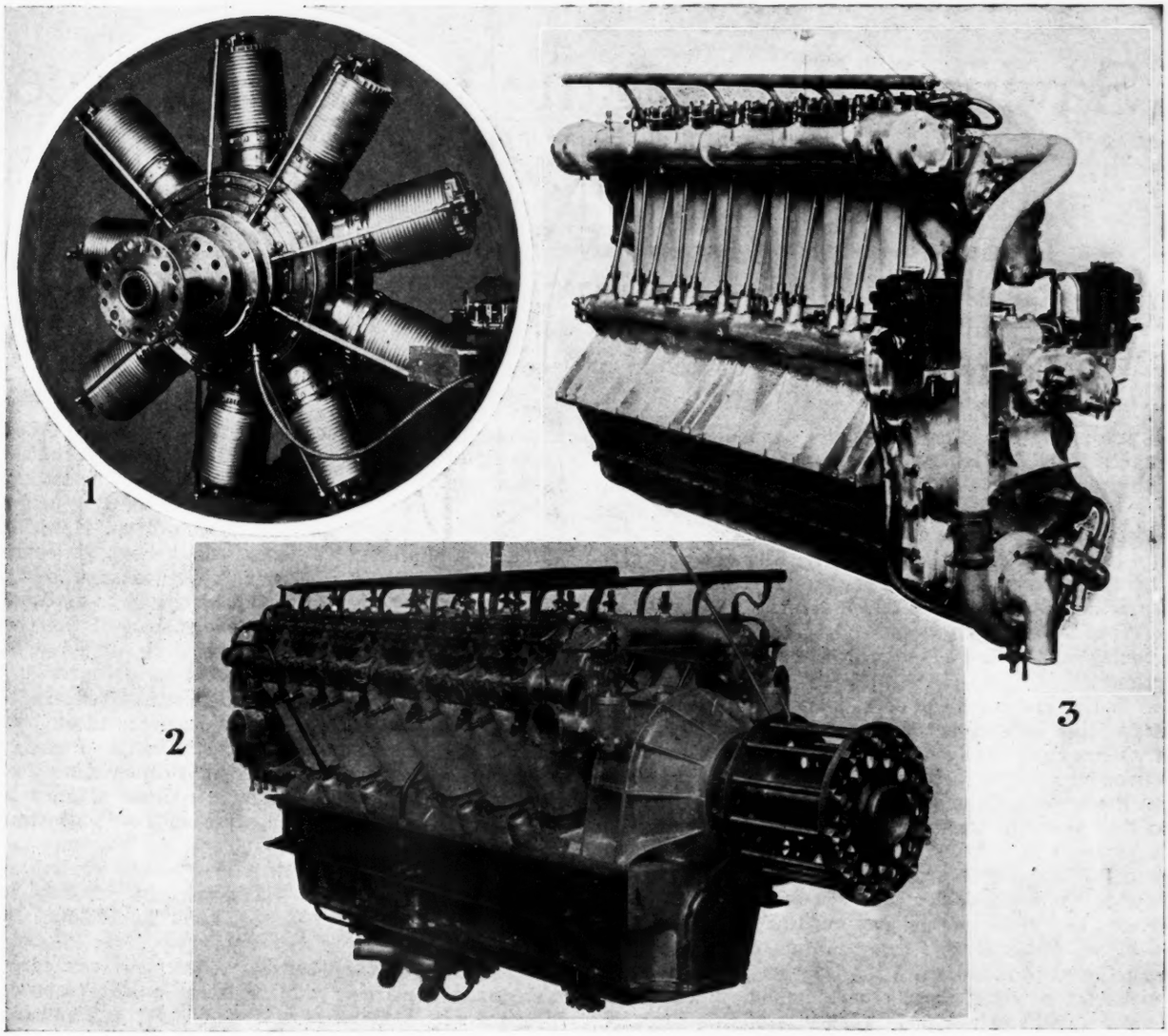
The only armed machine exhibited is the Fairey seaplane, of which the British Air Ministry forbid the giving of full details. It is, however, evidently a very fast and heavily loaded machine to judge from its very large floats and its 450 hp. Napier engine. The wings are provided with a variable camber gear under the control of the pilot, and the latter has an adjustable seat which enables him to sit in one position for ordinary flying and in another for alighting.

Engines

The engine section of the exhibition is naturally of considerable interest from an engineering point of view; it is fairly representative, although there are few very striking novelties. High output power units are very much to the fore, and there are at least three rated at 600 hp. or over. To judge from the airplanes on view the water-cooled stationary engine is easily the most popular type, the stationary radial second and the rotary third, and this order is corroborated by the number of different types of engines shown separately.

Pride of place, in view of the historical performance set up by this famous marque, must be given to the fine new Rolls-Royce "Condor" engine of 600 hp. This is a twelve-cylinder 60 deg. Vee, with four valves and two spark plugs per cylinder. The valves themselves are arranged in a dome-shaped combustion chamber—the plugs being in the cylinder walls—and are operated by levers which project from a casing surrounding the overhead camshafts. The latter are driven by inclosed bevel shafts. Ignition is by two twelve-cylinder magnetos. The engine is fitted at its front end with the typical Rolls-Royce epicyclic reduction gear. The cylinders and water jackets are built up of welded steel and the engine in general is an extraordinarily fine example of perfection in the carrying out of details. Each row of cylinders has its own carbureter, which is situated alongside the crankcase, a long inlet pipe passing through the middle of the cylinder rows. This pipe is furnished with a distinctly novel type of union, in the exterior of which are cut the teeth of a plain spur pinion which meshes with a similar pinion whereby the union is easily tightened up and locked. An electric starter with inclosed worm gear is used.

Another new engine is the big twelve-cylinder Sunbeam, rated at 800 hp. and called the "Sikh." The bore of the composite steel cylinders is roughly 7 in. (180 mm.) and the stroke 8¼ in., and 850 b.hp. is developed at 1200 r.p.m. Previous Sunbeam engines, of which several examples are exhibited, had multiple overhead valves operated by direct-acting overhead camshafts; but in this case, and also in that of the six-cylinder 400-450 hp. engine, which is practically half of the Sikh, the valves are worked by external push rods from a camshaft in the crankcase. There are six valves, in two rows of three each, per cylinder, and four spark plugs connected to four twelve-point magnetos. Starting is by hand or by electric motor. The mixture is supplied by four Claudel carbureters. This very large power unit is fitted with a plain spur pinion reduction gear contained in an extension of the crankcase. Other Sunbeam motors are the 400-hp. twelve-cylinder Matabele, the 300-hp. twelve-cylinder Manitou—both with reduction gears—the Arab (direct driven) 200-hp. eight-cylinder, the twelve-cylinder 275-hp. Maori, as fitted to the airship R-34, and the six-cylinder Dyak. On the smaller plants the starting crank at the end of the engine remote from the propeller hub drives the crankshaft through a re-



1—*The Zeitlin variable stroke engine giving constant power to* 12,000 *ft.* 2—*The twelve-cylinder Sunbeam "Sikh"* 800-900 *hp.* 3—*The six-cylinder,* 400-*hp. "Sikh"*

duction gear with dog clutch engagement, and also actuates a starting magneto at a relatively high speed.

Several types of Siddeley engines make their first appearance, in addition to the 230-hp. six-cylinder "Puma." First of these is the "Tiger," a unit of 500-hp. with twelve-cylinders in two rows set at 60 deg., and giving its power output at 1500 r.p.m., but with its propeller revolving at only 833 r.p.m. In this engine the steel cylinder barrels are screwed into aluminum heads with bronze valve seats, and the valves are operated by overhead bevel driven camshafts. A 300-hp. radial has 14 cylinders in two rows of 7 each, there being single valves in each head worked by outside push rods. The cylinders are again composite with steel barrels and aluminum heads. Ignition is by magneto and Remy battery set. The weight of this engine complete is 680 lb. A smaller unit of half the power with seven cylinders is made, and both these radials are adapted for compressed-air starting. The smallest Siddeley engine is a horizontally opposed twin of 45 hp., employing the same cylinders as the above.

The only "broad arrow" engine, with three rows of four cylinders, is the 450-hp. Napier Lion, a motor which has put up some remarkable performances lately and was described in AUTOMOTIVE INDUSTRIES dated Nov. 20, 1919. It has steel cylinders with steel jackets and detachable aluminum heads containing four valves per clyinder actuated by inclosed overhead camshafts. The starting arrangement consists of a device whereby explosive mixture is forcibly pumped into the cylinders and ignited by hand-operated magneto. A reduction gear is fitted.

A novelty in engines is the Zeitlin nine-cylinder rotary, which exploits quite a number of new features. In the first place, the four strokes of the piston are all different. The working stroke is 181 mm., the exhaust stroke 203.5 mm., the suction 226 mm. and the compression 203.5 mm. This is effected by mounting the big end, not upon the crankpin directly but upon an eccentric sleeve surrounding the pin, and the object attained is that of providing perfect scavenging of the exhaust, as on this stroke the piston head approaches the cylinder head within a millimeter or so. Each steel cylinder has a central exhaust valve of an annular ring type, in the middle of which is placed the spark plug. It is claimed that the outrush of gases keeps the spark plug perfectly clean. The inlet is taken from the crank chamber through ports in the

(*Continued on page* 327)

Saving a Ton on the Long-Distance Truck Haul

The truck, which lately has become so important a factor in long distance transportation, often carries an unnecessary load because the body building industry has not kept pace with the chassis development. The body plan presented was designed to increase the pay, but not total load.

IN presenting this plan for a more economical long distance body for trucks, we are forcibly reminded of the needs of a better development of a truck body industry. At present the plan appears to be for the truck manufacturer to build the chassis, and leave the body problem up to the dealer or the customer. The exact percentage of truck chassis that leave factories equipped with bodies is difficult to obtain, but it is small. Most of the factory built bodies are stock models, such as coal dumping bodies or the more generally used stake body construction.

Van bodies are chiefly of local manufacture; one argument for this custom being the difficulty of shipping a truck so equipped. Only in instances where the purchaser is near enough to the factory to drive the truck away does he get the benefit of the manufacturer's experience in this work. As a result, the truck dealer often has a chassis on hand from six weeks to three months, awaiting the body that will make it useful to the purchaser. During this period the truck dealer has his money invested in the chassis, as the buyer will not pay until he can begin using the vehicle. Much of this delay is due to the failure of manufacturers to standardize the location of controls and dimensions for truck chassis parts which influence the dimensions of the cab or body. Because of this situation, a body manufacturer cannot build bodies in quantity but must await the chassis before he can construct the body. This situation was referred to at some length in an article in the Engineering Number of AUTOMOTIVE INDUSTRIES by J. Edward Schipper.

In the body here described and illustrated, which was designed by the engineers of the Highway Transportation Division of the Goodyear Tire and Rubber Co., there is a saving of one ton as compared with the average body designed for the same purpose. It does not require a statistical expert to arrive at a clear idea of the saving such a body will mean in a long distance haul. Such bodies are now in common use for hauling from New York to Philadelphia and much longer distances. Calculate the saving of one ton of haulage for a truck covering such distances, and the use of such a body will be apparent.

The great need is for the development of the truck to a point where a proper body building industry can be economically established.

The rapid development of pneumatic tired trucks has caused a demand for some new development in body design, first because any excess weight has a direct bearing on the life of the tires, and, second, because hauling around continuously any excess weight introduces a direct charge against the cost of operating the truck. For instance, if it costs 10 to 15 cents to haul one ton one mile and the body is one ton heavier than is absolutely required, the expense of hauling that excess weight amounts to the very neat sum of $1,000 to $1,500 in 10,000 miles of operation.

In the design of the body here described, precedent was disregarded entirely; the members were computed for strength with a factor of safety of 5, and one member was made to serve the purpose of two or more as far as possible. For instance, the floor is laid crosswise and directly upon the chassis frame, thereby removing the necessity for heavy under framing. Then, too, the corner angles are made to serve three purposes, first, as a means of fastening the sides to the floor; second, as a protection against side swiping, and, third, as a beam to support the sides and outer ends of the floor.

Fig. 1—General view of truck with plywood body

Fig. 2—Tire storage compartment in plywood body

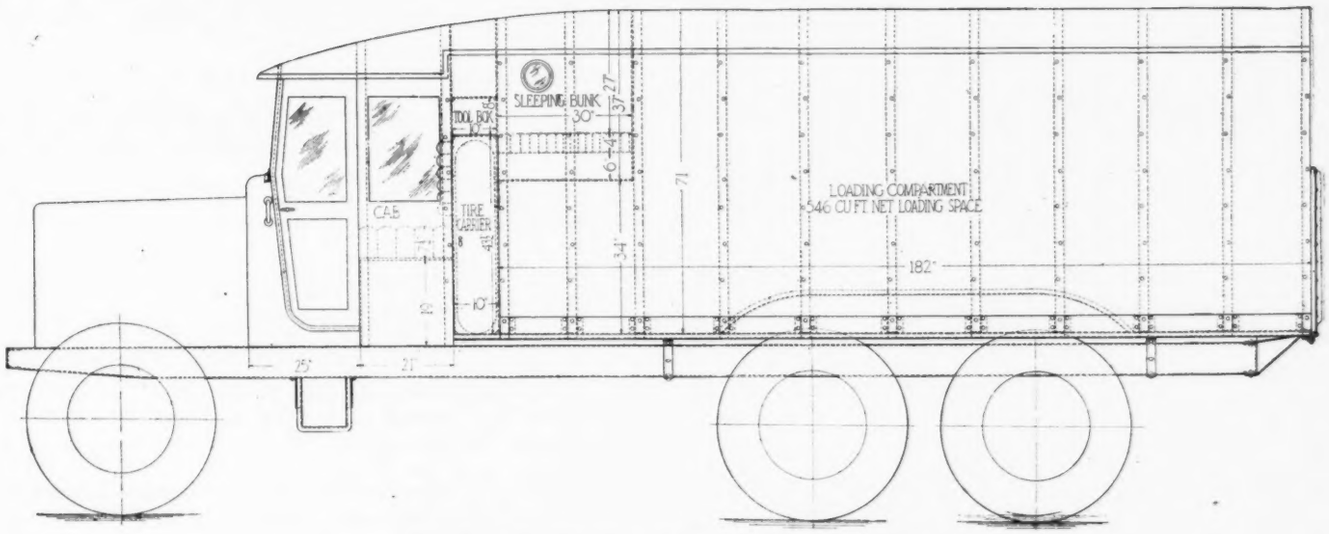


Fig. 3—Side elevation of truck with plywood body

The body is composed of the cab, bunk, tire carrier, tool box, and loading compartment.

The front of the cab is set off with a pressed steel dash on which all the instruments are mounted. The windshield is mounted on the dash. The doors open on both sides of the cab. The windows can be dropped in pockets when not in use. The auxiliary gas tank and storage battery are located under the driver's seat. The seat is fitted with a well-built spring cushion and accommodates four men comfortably.

The tire carrier, Figs. 2 and 3, is located just back of the cab. Two inflated 40 x 8 in. cord tires can be carried end to end in this compartment.

The tool box, Fig. 3, is located back of the cab, over the tire carrier, opening into the cab. It is 3 x 10 x 48 in.

The bunk, Fig. 3, is located back of the tire carrier and tool box. It is fitted with a box spring and mattress and affords ample room for comfortable sleeping. There are two small round glass windows in the ends of the bunk, and two ventilators in the side of the bunk, opening into the rear end of the body.

The loading compartment, Fig. 3, is 15 ft. long, 6 ft. high and 7 ft. wide. Deducting the space occupied by the bunk and wheel housings, we have 546 cu. ft. of net loading space.

Practically all of the covering of the body is of Haskelite (plywood). The cab, sides of body, tire carrier, tool box, and bunk are all of 5/16-in. Haskelite. The roof is of ⅛-in. Haskelite covered with 4½-oz. duck.

Six-ply Haskelite was used for the floor. It has the following properties: Static bending, elastic limit, 9060 lb. p. sq. in.; modulus of elasticity, 1,540,000; static bending, ultimate strength, 12,900 lb. p. sq. in. The floor is calculated as an overhanging beam 1 in. wide (Diag. A). The overhang is 25 in. on either side of the frame and the frame channels are spaced 34 in. apart. The load of 10,000 lb. is distributed over 98 sq. ft., giving a uniform load of 102 lb. p. sq. ft., or 0.708 lb. p. sq. in. Using a factor of safety of five, the working stress of the Haskelite is

$$\frac{9060}{5} = 1812 \text{ lb. p. sq. in.}$$

The bending moment at the point of support is

$$\frac{Wa^2}{2L} = \frac{59.5 \times 625}{168} = 222 \text{ in.-lb.}$$

where W = total weight,
a = length of overhang in inches,
L = length of beam in inches.

The moment at the center of the floor is

$$\frac{W\,(L\text{-}4a)}{8} = \frac{59.5\,(-16)}{8} = -119 \text{ in.-lb.}$$

Then applying the flexure formula, $M = \frac{SI}{c}$ for a ⅞-in. thick floor we get,

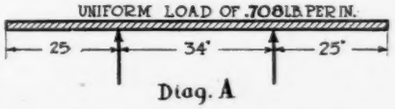
$$S = \frac{222 \times 0\,4375}{0.056} = 1735 \text{ lb. p. sq. in.}$$

where M = maximum bending moment,
S = allowable working stress,
I = moment of inertia,
c = distance from extreme fiber to center of gravity.

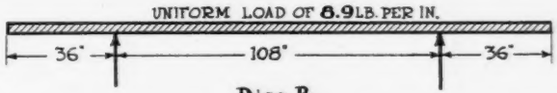
The deflection of the floor at the end of the overhang is

$$\frac{Wc}{24EIL}[3c^2\,(c\,2\,l) - l^3]$$

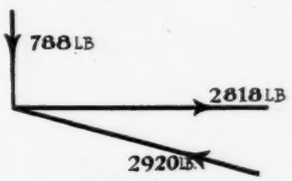
where W = total load,
c = overhang,
E = modulus of elasticity,



Diag. A



Diag. B.



Diag. C

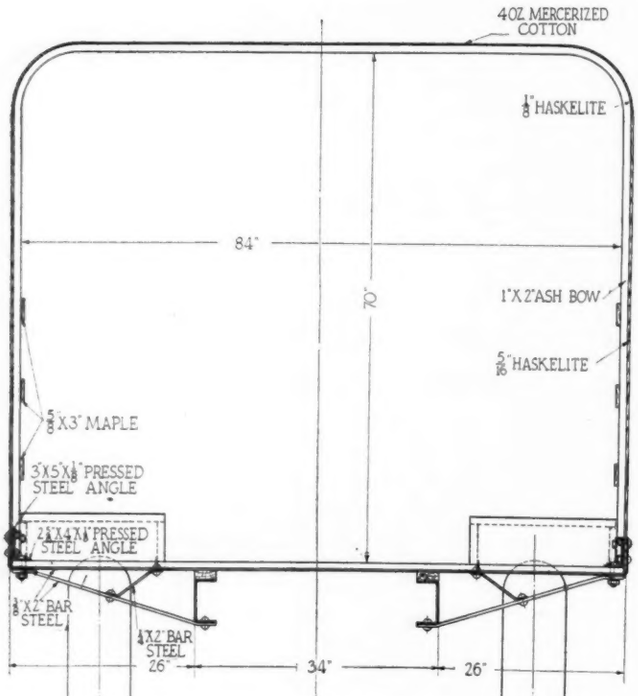


Fig. 4—Section through side brackets

I = moment of inertia,
L = total length,
l = length between supports.

$$\frac{59.5 \times 25}{25 \times 1{,}540{,}000 \times 0.056 \times 8} [3 \times 625 (25 \times 68) - 39{,}304]$$

$$= 1.1 \text{ in.}$$

Deflection of floor at center =

$$\frac{Wl^2}{384EIL} (5l^2 - 24c^2)$$

$$\frac{59.5 \times 1156}{384 \times 1{,}540 \times 0.056 \times 84} (5 \times 1156 - 24 \times 625)$$

$$= 0.2 \text{ in.}$$

A single angle was considered, along each outer edge of the floor, to support the bows and fasten the floor, this angle in turn to be supported by brackets which are bolted to the frame.

These angles take the 1.1 in. deflection of the floor at the outer edge and eliminate the deflection in the center of the floor between the frame channels. The angle acts as a beam with end overhanging 36 in. (Diag. B). It is supported symmetrically at points 108 inches apart, and carries a total load of 1600 lb. The bending moment at the center of the angle is

$$\frac{W(l\text{-}4a)}{8} = \frac{1600 (180\text{-}4 \times 36)}{8} = 740 \text{ in.-lb.}$$

The bending moment at points of support is

$$\frac{Wa^2}{2l} = \frac{1600 \times 36^2}{2 \times 180} = 5760 \text{ in.-lb.}$$

Using a 3 x 5 x 5/16 angle, with the above moments, in the flexure formula we get,

$$S = \frac{Mc}{I} = \frac{7210 \times 3.32}{6.3} = 3800$$

The deflection at the center of the angle is

$$\frac{Wl^2}{384EIL} (5l^2 - 24c^2) = \frac{1600 \times 11{,}664}{384 \times 29{,}000{,}000 \times 6.3 \times 180}$$

$$(5 \times 11{,}664 - 24 \times 1296) = 0.042 \text{ in.}$$

The deflection at the end of the angle is

$$\frac{Wc}{24EIL} [3c^2 (c\,2l) - l^3] = \frac{1600 \times 36}{24 \times 29{,}000{,}000 \times 6.3 \times 180}$$

$$[3 \times 1296 (36 \times 216) - 1{,}259{,}712] = 0.02 \text{ in.}$$

This angle did not meet our requirements, so it was decided to use two angles each half the thickness of the 5/16 in. angle. This combination, Fig. 4, holds the floor securely, holds the side panels and affords a secure footing for the bows and bow brackets.

There is a vertical force of 788 lb. acting downward (Diag. C.) on the side floor bracket, Fig. 4. This load is resolved into two components, one acting at right angles and the other acting at 74 deg. 20 min. with the vertical. The horizontal force then is 2918 lb. tension in the horizontal member of the bracket and 2920 lb. compression in the lower bracket member. Using a 3/8 x 2 in. bar steel strut in Rankin's formula for struts,

$$S = \frac{P}{A}\left[1 + \Phi\left(\frac{l}{r}\right)^2\right]$$

$$= \frac{2818}{0.75}\left[1 + \frac{1}{25000}\left(\frac{25.9}{0.108}\right)^2\right]$$

$$= 12{,}300 \text{ lb. p. sq. in.}$$

Where A = section area,
P = force,
S = allowable stress,
$\Phi = \frac{1}{25000}$ for steel struts with fixed ends,
l = length of strut,
r = radius of gyration.

The allowable working stress of the bar steel is 13,000 lb. p. sq. in.; thus the 3/8 x 2 in. strut will carry the stress,

(*Continued on page* 320)

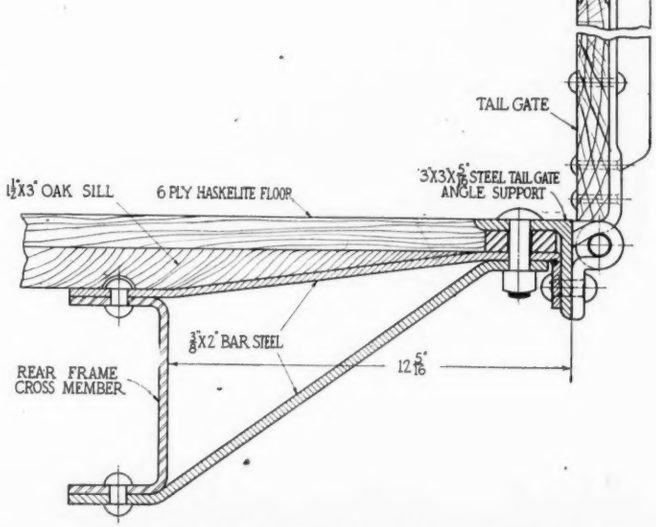


Fig. 5—Section through rear bracket support

Highway Transport Text-Book Planned for School Work

Permanent Committee on Highway and Highway Transport Education outlines definite course of procedure and a means of preserving the accomplishments of the various committees in the investigations.

THE Permanent Committee on Highway and Highway Transport Education determined at its first meeting held in Pittsburgh that an intensive and exhaustive investigation into all phases of highway economics should be undertaken immediately to provide the necessary data for a text-book. The purpose of the text-book is to develop authoritative information on this rapidly developing science of transportation.

This educational program, which is purely co-operative, will be conducted by a permanent organization selected from the nation's leading educators and scientists within a few months.

Just what the committee proposes to do was aptly illustrated by Roy D. Chapin, representative of the National Automobile Chamber of Commerce at the Pittsburgh conference. Inasmuch as this movement marks the first time in the history of highway transportation that there has been a unification of all interests, Chapin believes it is possible to develop economics of highway travel to the same value as the principles which govern railroad transportation. As this field of economic endeavor has been only slightly explored, Chapin suggested that the work of the committee should afford a basis for a working text-book.

It was announced that F. L. Bishop, dean of engineering, University of Pittsburgh, had been named chairman of the committee on organization. Chapin and Thos. H. MacDonald, chief of the Bureau of Public Roads, are the other members. This committee is engaged in developing the personnel of the permanent administrative organization. The recommendations as to personnel, finance and other matters will be submitted to the general committee at the meeting in Washington Sept. 18.

It is the intention of the general committee to hold conferences with the faculties of several of the leading universities. To expedite the work, several committees were named by the Pittsburgh conferees.

The function of the committee on research is primarily to co-ordinate efforts in highway and highway transport and automotive research. It is their aim to encourage this type of research in those institutions capable of taking it up. The problems which confront experts in research will be assigned to appropriate organizations, such as the National Research Council, in order to avoid duplication. The committee to outline this work is T. H. MacDonald, chairman; Ernest Farr of Firestone Co.; Prof. A. H. Blanchard, of the University of Michigan; T. R. Agg, of Iowa State Agriculture College, and Col. Mason N. Patrick of War Department.

Dr. W. K. Hatt of Purdue University is chairman of the committee on vocational training and extension education. The committee includes Dean Rieber of University of Wisconsin; Dr. Lambkin of the Federal Board of Vocational Education; Col. Patrick, Dean Charles E. Ferris of University of Tennessee, Col. William D. Uhler of Pennsylvania Highway Commission, and Ernest Farr.

The committee is charged with the duty of devising adequate methods for extension of education in the science of highway transport and automotive subjects in vocational schools and to bring about a closer co-operation between state highway departments and various university extension departments. One of the principal missions of this organization will be to substitute, whereever possible, the gas combustion engine as a unit for analysis instead of the steam engine. They will also endeavor to encourage study in specialized knowledge, especially in automotive research and design. The industry has expressed a willingness to aid this instruction by employment of students during the summer in factories, with pay.

This educational campaign will figure prominently in the elementary and high schools. It is proposed to prepare inspiring data for the use of these pupils. Every effort will be made to encourage the youth in the selection of a career emphasizing, of course, the advantages and dignity of highway economics. In the elementary schools, the work will run to instruction in rules of the road and safety first methods. George C. Diehl of A. A. A. is chairman of this committee and is assisted by Dr. C. D. Jarvis, Dr. F. F. Bunker and Dr. W. C John of Bureau of Education, and R. C. Hargreaves of Detroit.

One of the outstanding features of the conferences was the decision of the University of Pittsburgh to engage prominently in the educational movement. This school will send out a "University on Wheels" this fall and winter. A completely equipped truck will visit available garages for the purpose of a practical demonstration. A lecturer will explain the object of the visit and give lessons in truck operation and repair. Various other types of automotive equipment, including passenger cars and tractors, will be demonstrated. Factories will provide motion pictures and other illustrations which will aid in these special courses. Highway engineers will co-operate and explain the fundamentals of highway construction.

The first of the conferences with college officials will be held at Pittsburgh in November. The committee in charge of university conferences and field work is headed by Dean Bishop, Roy D. Chapin, Paul D. Sargeant, president of the American Association of State Highway Officials; A. G. Batchelder, of A. A. A.; Pyke Johnson of National Automobile Chamber of Commerce; W. S. Keller, state highway commissioner of Alabama, and Dr. John.

The committee on publicity has Dr. W. C. John for chairman, assisted by Pyke Johnson and H. S. Fairbanks, editor of *Good Roads*.

English Design and Operation of the Motor Bus

Part II

In this article Mr. Bourdon takes up the pre-war "B" type bus and the post-war "K" type. Both the body and the chassis of the "K" type being entirely new, only the chassis is described here. The body, which seats 46 people with only a slight increase in weight, will be taken up later.

By M. W. Bourdon*

IN 1914 and until recently the "B" type London bus represented the latest model in service, and it still forms the majority among those in use. Like practically all London motor buses since their introduction nearly twenty years ago, it has 34 seats (16 in and 18 out); interior passengers are accommodated on longitudinal seats, eight passengers on each side, while the nine outside seats all face forward, each accommodating two passengers. No protection other than aprons is provided outside. Overcrowding is not normally permitted, but the war-time relaxation of this rule, permitting five persons to stand along the interior gangway, still applies, and will probably do so until the number of vehicles in use more nearly approaches the demands of the traveling public.

Following are some of the chassis details of the "B" type bus.

Engine—Bore and stroke, 115 x 140 mm. (4½ x 5½ in.) four cylinders, developing 25.2 bhp. at 750 rpm. This engine speed with a rear axle ratio of 7⅓ to 1 and 1000 mm. (40 in.) tires, gives a vehicle speed of 12 mph. The latter is the legal limit of speed for a motor vehicle of this weight and type, but not infrequently on the less congested thoroughfares the buses are driven at road speeds of 20 and even 25 mph., for no governor is fitted to the engine.

Cylinders—In pairs with valves on opposite sides, camshaft and magneto driven by silent chain.

Gear-set—Three speeds forward, the first and second through silent chains, top direct; the chain sprockets are brought into use by dog clutches and provide reductions in the gear-box of 3.2 to 1 and 1.7 to 1. The ratios between engine and road wheels are therefore: First speed, 23.4 to 1; second, 12.4 to 1; top, 7.33 to 1.

Rear Axle—Full floating type, with axle tubes machined from the solid bar and a cast steel center casing.

Drive—By straight worm with three leads, the worm wheel having 22 teeth; the worm is below the wheel.

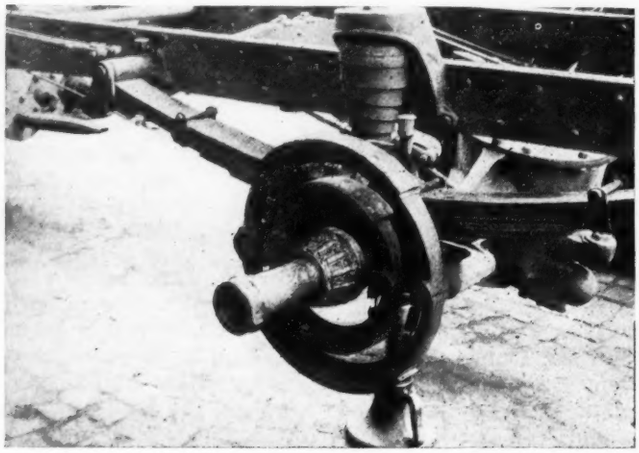
Brakes—Two pairs of internal expanding shoes within drums on the rear wheels; shoes operated by cams.

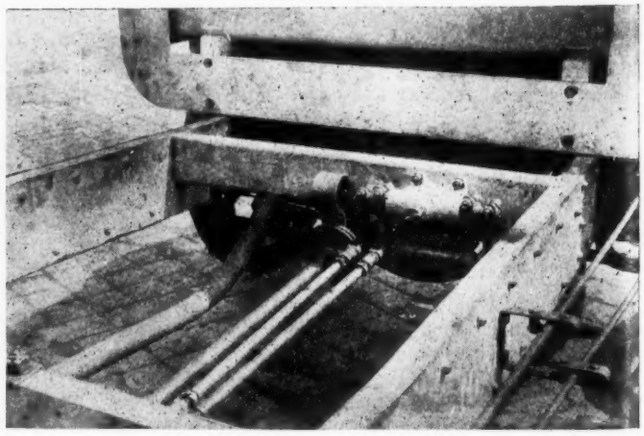
Tires—Twin solid at rear, 1000 x 100 mm. (40 x 4 in.); singles in front, 900 x 120 mm. (36 x 4¾ in.).

Radiator—Vertical copper tubes without gills; thermo-siphon water circulation.

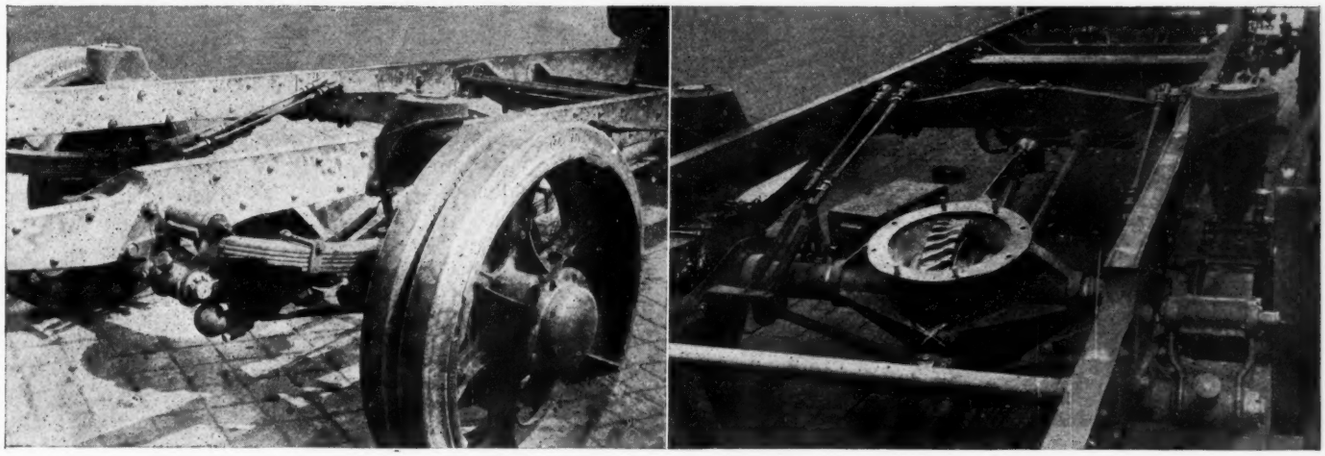
Frame—Parallel for whole length, 42¼ in. wide; width of each member 1¾ in., made up of two nickel steel plates each 3/16 in. thick, with an ash filling 1⅜ in. wide. Maximum depth of frame side members, 7 in.

Mr. Bourdon is engineering correspondent of AUTOMOTIVE INDUSTRIES *in the United Kingdom.*





The A. E. C. K. type chassis. To the left—Details of the volute spring and its mounting on the side member of the chassis. The casing contains a second volute spring besides the one that is visible. The photograph shows clearly the brake arrangement. To the right—The clutch shaft and adjustable clutch brake and also the gear selector rods



The A. E. C. K. type chassis. Details of the rear springing and cast steel detachable wheel construction. The other illustration shows details of the back axle with the lid of the casing removed to show the worm wheel. The photograph also shows the pressed steel torque member and its bracket suspended from the rear cross member of the chassis

General Dimensions—Wheelbase, 170 in.; track, 66 in.; extreme width over hub caps, 85¾ in.; overall length of chassis, 230¼ in.; minimum ground clearance, 10½ in.; length from dashboard to rear end of frame, 175 in.

Prior to 1910 great difficulty was experienced in reaching the standard of transmission silence set by the licensing authorities. When straight toothed gear wheels were used in the gear-set, buses were constantly being "called off" by official inspectors; all kinds of tooth shapes, lubricants and other possible specifics were tried; in fact, at one period sawdust was, to the writer's personal knowledge, mixed with the oil in the gear case, but although this would sometimes enable a bus to pass the official test, the benefit and consequently the run of the license were of brief duration.

The New "K" Type Bus Chassis

The most pronounced development in London bus design which has ever occurred at one step is evidenced by the new "K" type chassis and body. The latter will be dealt with in a separate article, for the details of its construction represent so great an advance as to justify special and particular treatment. The following, therefore, mainly concerns the chassis, but here it may be said that, although only some 80 of the new type are yet in use, there is already observable a clear preference for them by the public; even passengers in a hurry will allow a "B" type bus to pass by if they see in the distance a "K" bus approaching. The extra roominess and comfort of the later type are widely appreciated.

The main object of the designers of the new chassis was to build a vehicle able to carry 46 passengers instead of, as previously, 34, without increasing the weight of the vehicle unladen, and without increasing the overall dimensions, except as regards a few inches in length, the width of the "B" type vehicle having already attained the maximum allowed by the police regulations. The fact that the designers have succeeded entirely in their prime object is sufficient to attach special interest to the design; but the latter also incorporates other desirable developments in this type of public service vehicle, especially with regard to the rapid loading and unloading of passengers.

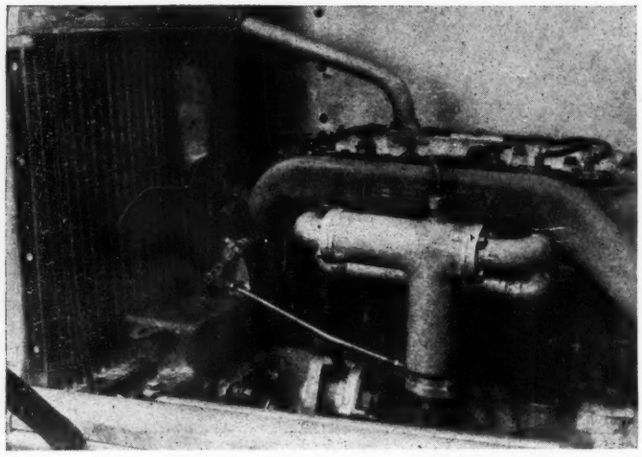
Perhaps the most striking difference, at any rate from the point of view of the casual observer, is the position of the driver, for he now sits in the space previously occupied by the right-hand side of the hood, i.e., he is positioned on the right of the engine between the radiator and the dashboard. This arrangement allows of all the latitude of movement required for driving operations. There is a false dashboard in front of the driver to serve as protection against the weather; to his left, and a little to the front, is the engine, while immediately to the left is the fuel tank, which is secured to the front panel of the body. The brake and gear levers come naturally to the driver's right-hand and at the same time allow of his easy ingress and egress to and from his seat.

As a result of this repositioning of the driver, not only does he get a better view of the road ahead by being placed more forward and, of course, higher, but while the overall length of the vehicle has not been increased materially the space available on the chassis for the bodywork is nearly 24 in. more than previously. Also the loading platform at the rear is increased in length without increasing the overhang behind the rear axle. In fact, the more even distribution of the load on the "K" chassis actually results in a reduction of the body overhang.

But while the new position of the driver is the most spectacular variation, the most creditable improvement from an engineering point of view is the provision of a chassis capable of carrying a considerably larger body and 12 additional passengers in greater comfort without exceeding the official maximum unladen weight of the complete vehicle. Fully equipped for service, the bus weighs approximately 7600 lb., as against the maximum allowable weight of 7840 lb. Of this total the body accounts for 2350 lb. It was necessary, however, to obtain a special concession from the licensing authorities in the matter of laden weight, for, obviously, the load represented by 46 passengers, the driver and the conductor—taking the official average of 140 lb. each—brings the laden weight in excess of that hitherto permitted, viz., 13,440 lb. Fully laden, then, the new bus weighs 14,320 lb.

The pre-war (B) type of bus closely approached the maximum unladen weight, despite its accommodating only 34 passengers, and the new model with seats for 46, with at least as much platform and seat space for each, represents no mean accomplishment in designing, and one that must ultimately result in an appreciable reduction in operating costs per passenger carried. Especially is the latter likely to be the case when the improved fuel consumption is considered, for, contrary to what might be expected, the new bus runs nine miles per Imperial gallon as compared with the eight miles obtained with the pre-war type.

Another important feature of the new chassis is the



The A. E. C. K. type chassis. Left side of the engine, showing the valve gear, the water jacketing of the induction line, the position of the magnets (the casing of which is removed, but it is held in position by the loose metal strap that may be seen) and the platform for the dynamo, which is not in position

springing, improvements in which have materially increased passenger comfort and reduced potentialities for undue wear and tear from excessive vibration, particularly when the bus is other than fully or almost fully loaded. Flexible springs which would be deflected considerably with variations between no load and full load are not permissible, and yet flexibility is as desirable under the former condition as under the latter. The system adopted after prolonged experiment and test comprises a set of semi-elliptics fore and aft, those at the rear being supplemented, as the load approaches the maximum by the outer of two pairs of concentrically arranged volute springs formed of flat section steel. By this means the total deflection caused by loading from an empty condition to the maximum amounts to only 3¼ in., while, when in motion, the maximum additional deflection due to the absorption of road shocks is but 1½ in. Obviously this restricted deflection enhances stability, but this desirable advantage is attained without providing a harsh suspension, such as would occur with stiff and unassisted semi-elliptics. Actually, when the bus is fully laden, the outer volute springs carry approximately 1000 lb. of the load.

The Engine

The four-cylinder engine has its cylinders cast in pairs and a bore and stroke of 100 x 140 mm. (approximately 3 15/16 x 5½ in.) giving 30 bhp. at 1050 rpm. It has lighter rotating and reciprocating parts than the "B" type, and as a result its normal speed is that just mentioned, as compared with 750 rpm. in the case of the older pattern. Gear ratios in the transmission are varied in accordance.

The cylinder heads are of the "L" type, all the valves being on the left-hand side with the stems and springs exposed, instead of being enclosed, as usual, by a detachable cover plate. On account of the arrangement of the driver's seat, all the engine components which must be accessible—valves, magneto, carbureter, water pump and oil filler—are carried on the left side, where they are immediately exposed to view on the raising of the half hood.

Aluminum pistons are used and the operating engineers have found them an unqualified success; they have axially split skirts with an expanding ring of cast iron inside. The wrist pin floats in the piston bosses without any special bearing intervening when the pistons are first fitted, but the bosses are made unusually thick, so that when wear occurs they can be bored out and fitted with bronze bushings. The pins are clamped in the connecting rod small ends.

The crankshaft is supported by three white-metal bearings with housings carried in the top portion of the crank case, the cylinders being bolted to the latter in the conventional manner. But the top portion of the case extends 6 in. below the center line of the shaft before the flange is formed for bolting up the lower portion. It is claimed for this box-like construction that the unit is stiffer and more rigid than when the usual system is adopted, i.e., dividing the case on the shaft center line. The lower part of the crank case forms an oil sump from which the lubricant is drawn by the gear type pump and delivered to troughs under the big-ends, the pump being skew-gear driven from the crankshaft and mounted within the top part of the crank case. The silent chain driving the three-bearing camshaft and the magneto is lubricated direct on its toothed side by a pipe leading from the oil pump; otherwise the interior parts are lubricated by splash from the big-end troughs, with oil pockets over the main bearings.

The magneto driving shaft is mounted on a sliding bracket, so that it may be moved to provide adjustment for the timing chain. Normally the magneto is enclosed by a water-proof casing, the cover and machine both being held in position by a quickly detachable metal strap. The lighting dynamo is located on a platform at the front righthand corner of the engine and is driven by belt from a pully mounted on a forward extension of the crankshaft; a similar pulley also drives the fan, the spindle of which is mounted eccentrically for belt adjustment; the dynamo belt adjustment is obtained by sliding the unit on its platform.

A Zenith carbureter is fitted, the mixture passing to the induction passages in the two cylinder blocks through a branched induction pipe which is very generously water-jacketed.

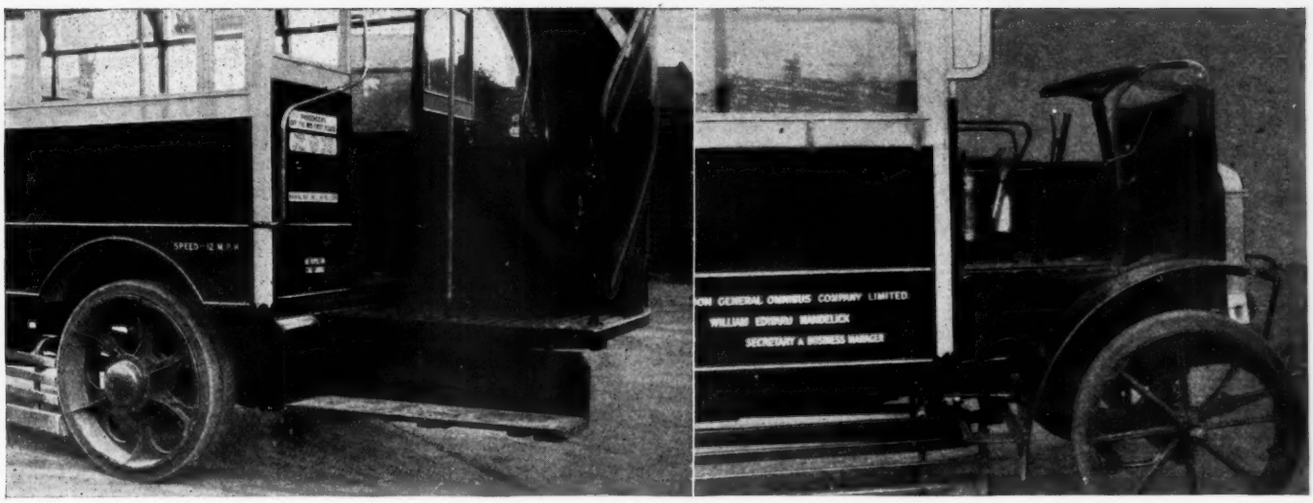
Engine cooling is by pump circulated water through a radiator which may be described as of the vertical gilled tube type, although the front two rows of tubes are not provided with radiating fins, as much for the sake of appearance as anything. There are five rows of tubes altogether, with top and bottom tanks of cast aluminum, the side plates and brackets being of the same material.

Transmission

The multiple plate clutch consists of floating fabric rings gripped between disks of hardened steel, the whole running dry. The main clutch spring is centrally disposed, small "first-intention" springs being provided between the plates to enhance the smoothness of engagement and also to insure positive disengagement. The clutch operating mechanism is of the direct acting type; an adjustable brake is provided on the clutch shaft, which has a pair of flexible joints interposed in its length.

Three speeds forward and the usual reverse are provided by the gear-set, in which silent chains displace the conventional spur pinions, the actual change of ratios being effected by dog clutches actuated by the usual lever working through a gate. Top gear is, of course, a direct drive. The aluminum gear box is suspended at three points, being held up under two adjacent cross members of the frame by three long bolts, which arrangement allows the unit to be readily removed for repairs and replaced by another without disturbing the body.

Behind the gear-set is an open propeller shaft having a star or ring type universal joint at each end, the pins of the joints being located in roller bearings, hardened steel disks between the jaws taking end thrust. The



The A. E. C. K. type chassis. The entrance to the body, which is supported by the projecting side member of the chassis, illustrated in another photograph, and the driver's compartment slightly above and to the right of the engine

propeller shaft ends are splined, the front end being free to slide in the joint behind the gear-set.

The rear axle of the full floating type embodies worm drive as in the "B" type chassis, but the straight worm is now carried under the axle instead of above as in the earlier pattern; this necessitates a slight inclination of engine and gear-set in the frame. The gear ratios of the new type are: top, 8.25 to 1; second, 13.6 to 1; first, 28 to 1. Several other departures from previous practice have accumulatively effected considerable reduction in the axle weight; the extension tubes are pressed directly into the axle centre, which is strengthened by vertical and horizontal webs, tie rods being used below. A large overall cover plate over the worm wheel allows the latter to be withdrawn from above with its bearings when the axle shafts have been removed through the wheel hubs.

A special feature is the spring plate torque member. It is a triangulated unit bolted rigidly to the axle center at the rear end, and supported in front by a riveted-on extension which passes into a vertical bracket of cylindrical outline secured to a cross member of the frame. In this bracket the squared front end of the torque member is free to slide longitudinally through a slot in a spherical bearing block, which itself is held between bronze sockets with rubber buffers above and below. This sliding motion and the lateral "give" of the spring steel plate allow for axle movement due to equal or unequal spring deflection.

The Brakes

Both hand lever and pedal brakes apply to drums secured to the rear wheel hubs. Each pair of drums is concentrically arranged with cam-operated internal expanding shoes having fabric facings; the ends of the shoes adjacent to the cams are provided with detachable wearing surfaces consisting of hardened steel plates which can be removed and replaced as wear occurs, these plates forming the only means of brake adjustment within the drums. The small diameter shoes are actuated by the hand lever, the others by pedal; thus the pedal requires a comparatively small leverage and no excessive foot pressure to insure the necessary braking effect. Brake operation is compensated in both sets by horse-shoe shaped coupling bars outside the frame on the right hand side; thereabouts also are the right- and left-hand threaded coupling rods for normal brake adjustment.

The cast steel wheels are detachable and fitted with 920 x 100 mm. (36 x 4 in.) solid rubber tires, the sizes being the same back and front, although twin tires are, of course, provided at the rear. Timken roller bearings are used for the hubs, the rear wheels being genuinely detachable and leaving the hub shells in position when they are removed; each is attached to its hub by four bolts only, but these bolts take none of the driving and braking stresses, which are carried by large dog clutches on the inner flanges of the hubs and the flanges of the wheel hub plates respectively.

Like many other firms engaged in the production of heavy motor vehicles, the Associated Equipment Co., the makers of the "K" type bus, is experimenting with giant pneumatics, although these are giving promise of success, this type of tire is still considered too much of an innovation to allow of definite conclusions being drawn as to its ultimate suitability for the vehicles of a large public service fleet.

Suspension

The main features of the suspension system have already been mentioned briefly, but the volute springs are such an important part of the system that they call for further reference. When assembled on the chassis, there is visible only one spring on each side, but there are actually two concentric springs in the component. The outer one gradually takes a portion of the load as the bus fills up with passengers, while the inner one serves to absorb road shock and prevent undue deflection; it also exerts a retarding effect when there is a tendency for the vehicle to roll, as when rounding corners at speed.

An H-section drop forging of 3 per cent nickel steel forms the front axle, which is downswept from each end. The swivel axles are forked to take the swivel pins, which are drawn into a taper in the axle ends and are set at an angle so as to bring the track line under their centres and thus facilitate steering movements. The steering gear assembly is similar to that of the "B" type bus, being of the worm and nut pattern, though there are now only two threads to the worm instead of three. The coupling rods are behind the axle, the thrust rod passing across the right hand side steering lever to the left-hand side road wheel.

Frame Construction

The frame of this new model shows no difference in

(*Continued on page* 320)

The Rolls-Royce Aircraft Engines Described and Illustrated

Part III

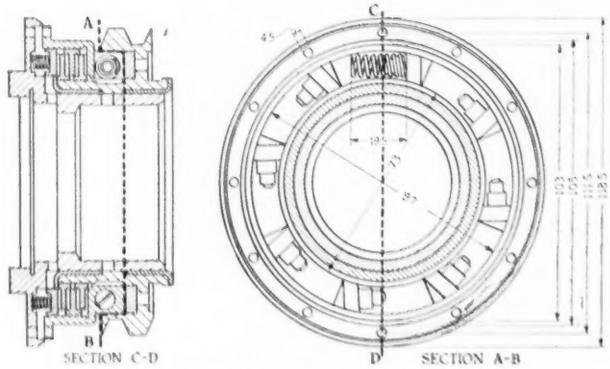
This is a continuation of the description translated from the German periodical "Der Motorwagen." This part takes up the camshaft and accessory drive, the lubrication system and the carbureter and intake manifold. The final portion will describe the epicyclic reduction gear.

THE camshaft is driven from the crankshaft through the intermediary of a number of interesting members, through two intermediate shafts which also deviate from normal construction. Mounted upon the rear end of the crankshaft is a very substantial worm, which is connected to the crankshaft through a serrated hub joint and a spring coupling damped by means of a disk brake. The design of this coupling is shown in detail. The object of this arrangement is to protect the camshaft drive and the accessories (such as the magnetos, oil, air and water pump, as well as the tachometer and the machine gun drives, which are also taken off this worm) against all injurious rotary vibration. With this worm of 24 teeth there meshes a worm wheel of 16 teeth which is mounted on a cross-shaft. This cross-shaft therefore rotates at 1½ times crankshaft speed. In addition to the worm wheel, there are secured to this cross-shaft two bevel gears with 20 teeth, which through the intermediary of bevel gears with 30 teeth, drive the intermediate shafts leading to the camshafts. These intermediate shafts, therefore, rotate at a speed of

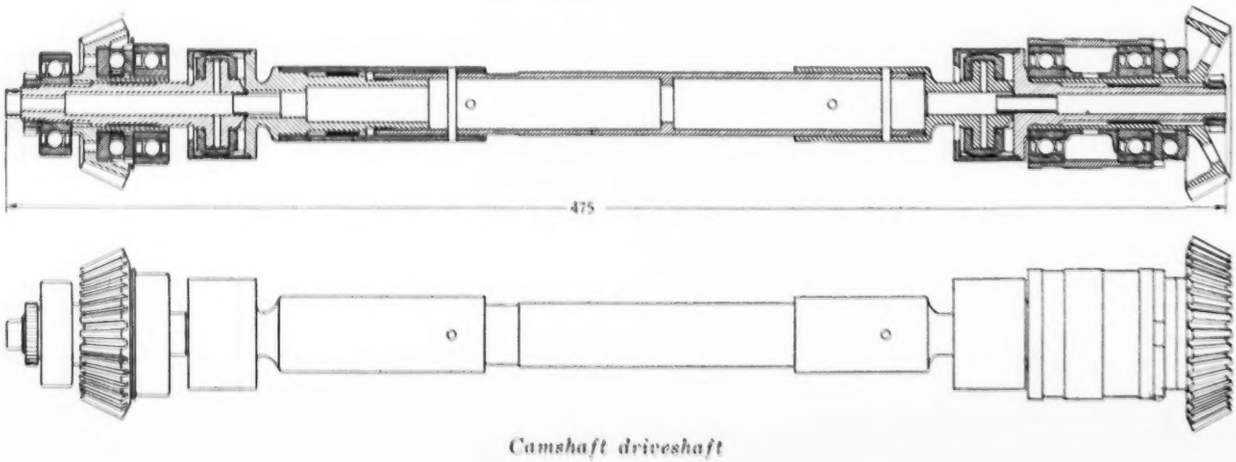
$$\frac{16}{24} \times \frac{30}{20} = \frac{1}{1}$$

times crankshaft speed. That is, at the same speed as the crankshaft. The reason for first increasing the speed and then reducing it again is that from the cross-shaft there are driven two of the four six-cylinder ignition magnetos with which the engine is fitted, which must be driven at 1½ times crankshaft speed. The camshafts are driven from these intermediary shafts through bevel gears with a ratio of two to one, with 25 and 50 teeth respectively.

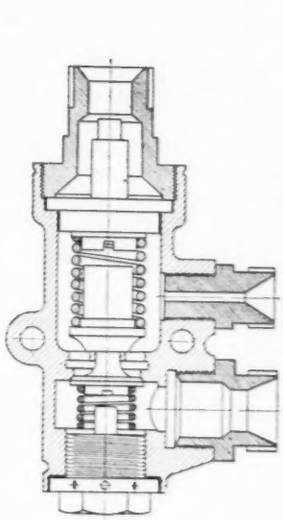
The intermediary shaft is also a very cleverly thought out design. In order to insure a perfect mesh of the bevel-gears under all conditions, in spite of heat expansion and vibration, this shaft is arranged so as to be movable in every direction. Vibrations are eliminated through one upper and one lower universal joint; longitudinal movability is assured by the serrated hub connection, a construction which on the Rolls-Royce engine can be found in practically every driving connection, and which has the advantage, in comparison with taper and key fastening, that it affords the greatest assurance of dependable operation. By making a few of the serrations non-uniform the joint will always be assembled in the same way. By the provision of banking tubes in the hollow parts of the shaft, the oil returning from the hollow shafts and their housings is conducted to the universal joints, and thus their lubrication is assured.



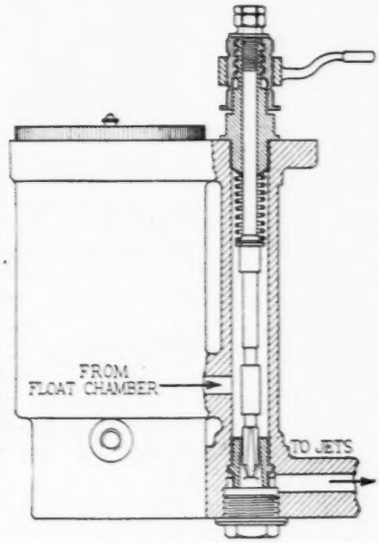
Accessory drive coupling



Camshaft driveshaft



Oil pressure relief valve

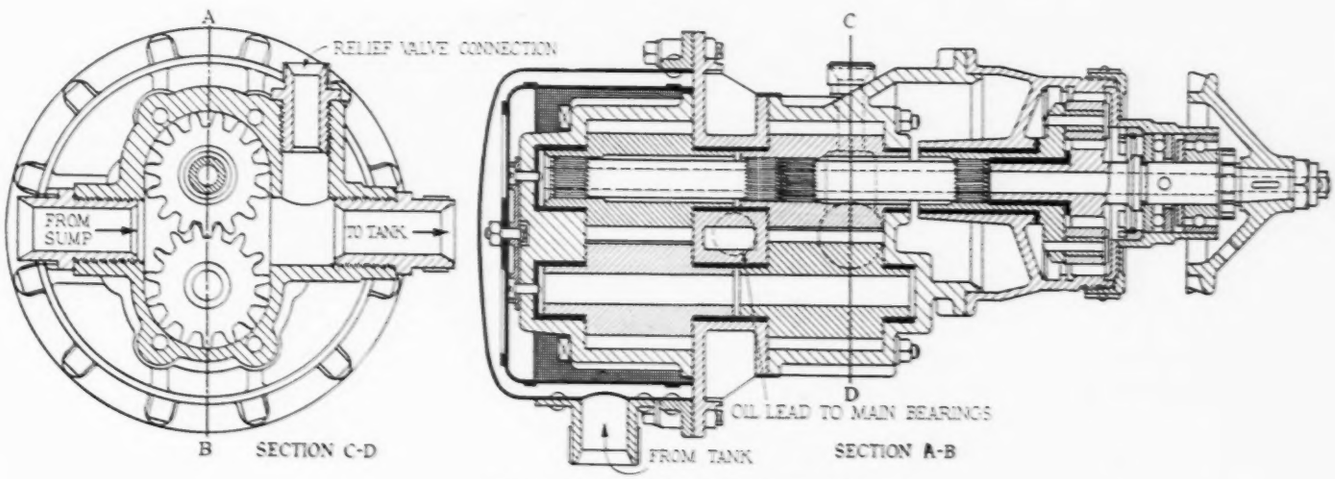


Fuel regulating valve

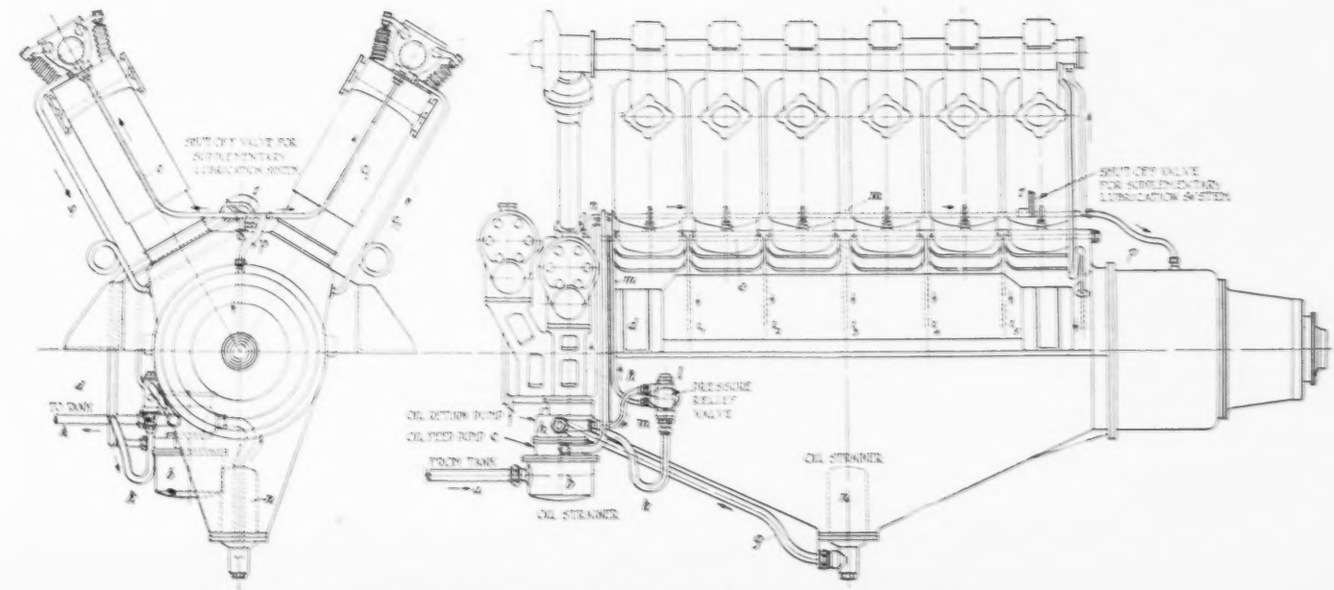
In the design of the intermediary housing attention has also been paid to the flow of the oil.

From the cross-shaft, which drives one pair of ignition magnetos directly through auxiliary shafts which are pressed into the main shaft and driven through serrations, the other pair of ignition magnetos is driven through a second cross-shaft, also through the intermediary of an auxiliary shaft. The construction of the second magneto drive is worked out in the same way as that of the first, as regards the arrangement of the shafts. This second cross-shaft also serves for driving the air pump and the tachometer. Both of these accessories are driven through a pair of helical gears. There is nothing noteworthy in the tachometer drive, so that we need not bother with a detailed description.

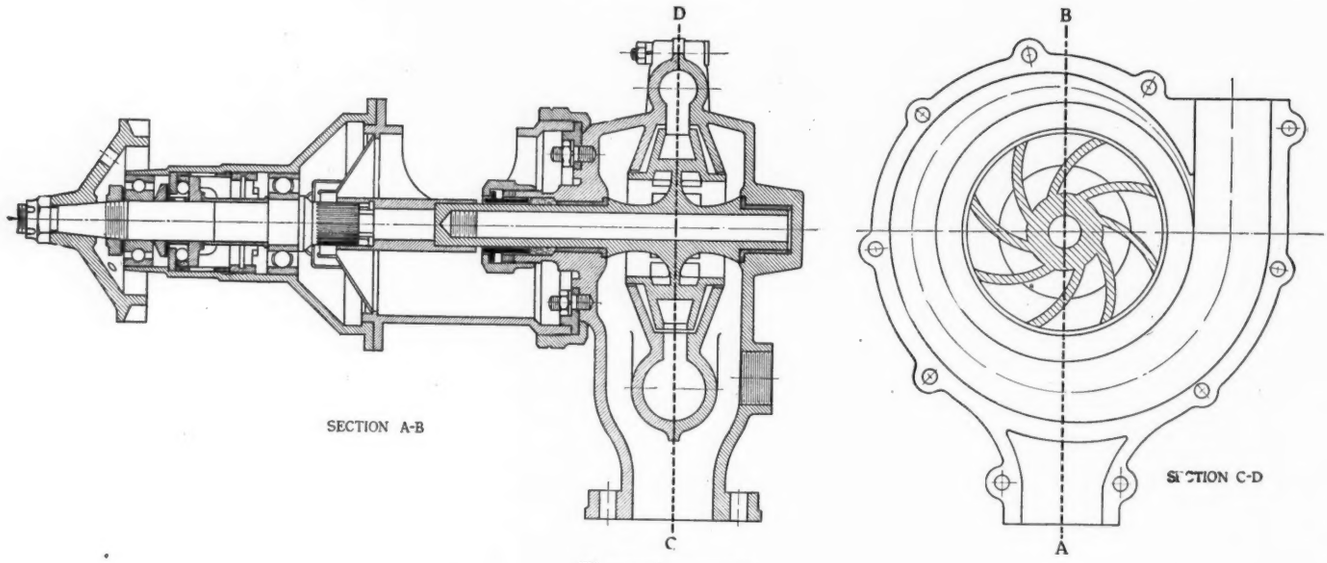
The machine gun drive is developed as a link drive for two guns, which is actuated from the rear end of the crankshaft. A cam disk mounted loosely on the camshaft is driven through two pair of gear wheels at propeller speed, the entire gearing being enclosed in the cam gear housing. Both cams of the cam disk actuate each of the two operating levers. The cam disks are not opposite on the same diameter, but make with the axis of the disk an angle of 153 deg., which is determined by the arrangement of the machine guns on the plane.



Two sections of the Rolls-Royce oil pump

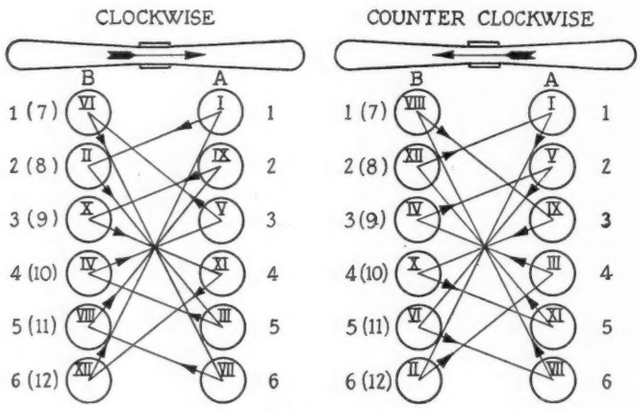


The oil piping system and location of pump and relief valve

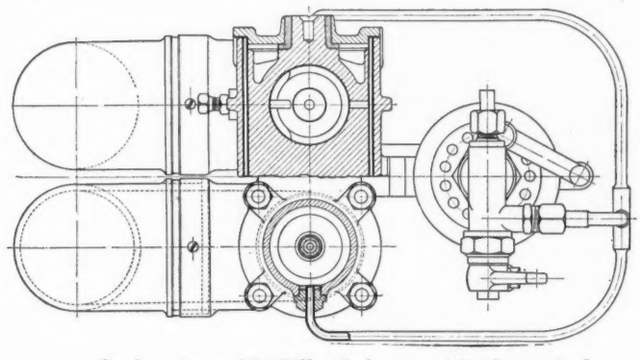


The water pump

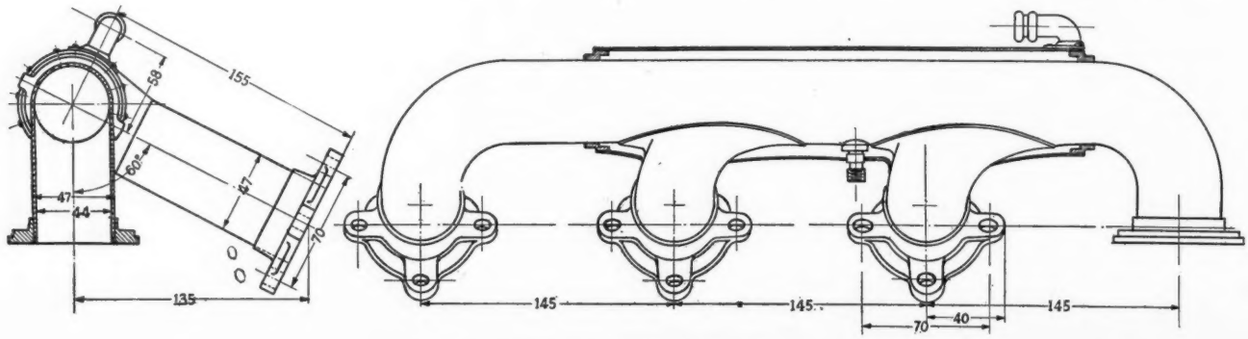
The water pump is also located on the rear housing, and is driven from the crankshaft through a spring coupling and worm wheel at a ratio of 1 to 1.5. The impeller is arranged for admission on both sides, so that the stuffing box, which is of normal design, needs to provide water tightness only against the suction pressure, which is reduced to a minimum by a suitable arrangement of the cooling water circuit. The danger of leakage and of loss of water is therefore exceptionally low. The impeller is formed in one piece with its shaft, which eliminates the risks of an unreliable method of fastening, and a loosening of the propeller in operation. The pump shaft is mounted in bronze bearings to both sides of the impeller, these bearings being lubricated by means of grease cups. The pump, with its driving gear, is secured to the housing in a double way. Securely screwed to the casing, by means of flanges, is a bearing housing in which the vertical shaft with the upper worm wheel is mounted in ball bearings. This housing is so developed that loss of oil at the pump shaft is practically impossible. Bolted to the pump housing is a disk by means of which the pump is connected to a bearing housing bolted to the rear part of the crankcase. Drive of the pump is effected by means of serrations on the pump shaft, the pump driving shaft and a coupling sleeve with serrations on the inside. The entire design of the water pump is notable on account of its simple interchangeability. For the water connections the pump housing is provided with flanges. The delivery



Firing order



Carbureter with Gillet-Lehman altitude control

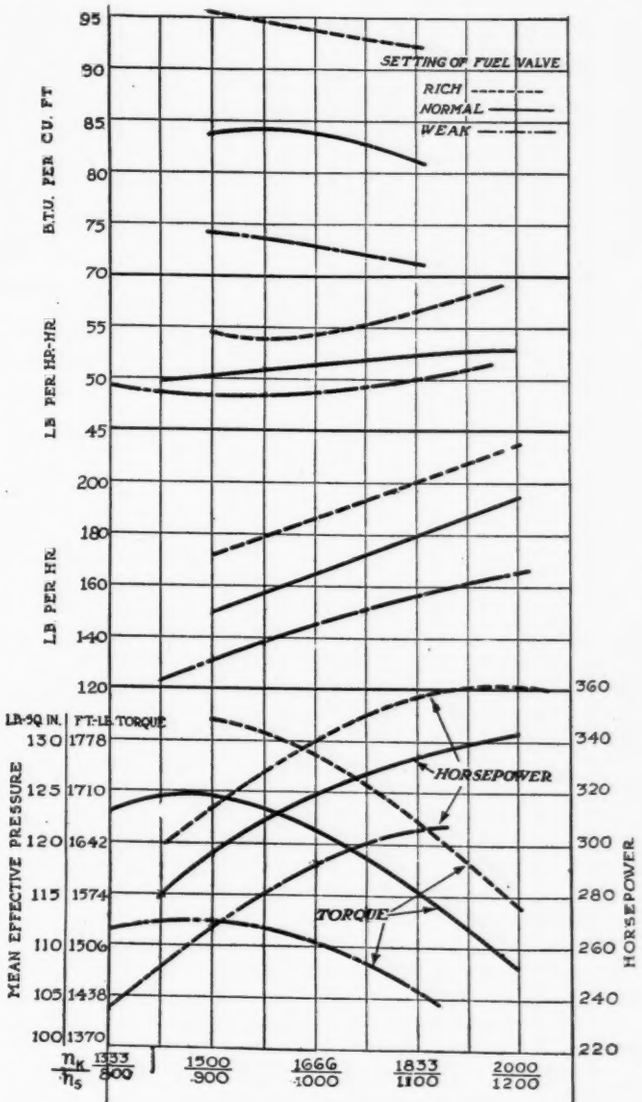


The intake manifold dimensions

line divides directly behind the pump into two branches which are carried along the lowest points of the water jacket on the outside of the engine, the pipe gradually decreasing in diameter. These distributing pipes of decreasing section insure uniform distribution of the water to the different cylinders. After passing through the cylinders, the water collects in two return pipes, passing along the tops of the cylinders, toward the radiator.

Originally the ignition system was developed as a single magneto system, and consequently only two six-cylinder magnetos were fitted. Later the two-point ignition system was adopted, and a second pair of magnetos was added. For reasons of reliability, it has evidently been considered inadvisable to make use of twelve-cylinder magnetos. If the engine is looked at from the propeller end, and we count on the left side from front to rear, and then continue on the right from front to rear, the firing order is as follows: For right-hand rotation, 1, 8, 5, 10, 3, 7, 6, 11, 2, 9, 4, 12; for left-hand rotation, 1, 12, 4, 9, 11, 6, 7, 3, 10, 5, 8.

Lubrication is by the so-called dry sump system; that is, the oil which collects at the bottom of the crankcase is drawn through a filter by means of an oil return pump, so that the crankcase is practically free of oil. The lubricating system is shown diagrammatically. The oil delivered by the feed pump is delivered to the main bearing distributing pipe *d*, which is cast into the upper half of the crankcase. A short distance from the oil pump there is a branch line *k* from this line, which leads to a pressure reducing valve *L*. Here the oil enters through a spring loaded valve, into a chamber from which branches a somewhat finer line *m*, which at *n* delivers the oil to the worm wheel which is located on the rear part of the crankcase, and farther forward through the branch line *p*, to the reducing gear, and through lines *o* and o_1 to the camshafts, whence it returns through the lines *q* and q_1 and the inclined driving shafts to the crankcase. In addition the oil pipe *m* leading to the cam gear housing is provided with a shut-off cock *t*, and an auxiliary line *s* branches off just behind this cock, from which small tubes *r*, r^1, r^2, etc., lead directly into the crankcase. In running-in new engines this auxiliary oil circuit permits of injecting additional oil directly into the crankcase, onto the connecting rod bearings. Any excess of oil delivered passes through a second spring-loaded valve in the head of the pressure reducing valve through pipe *k* into the pressure chamber of the oil return pump, and flows from there, together with the oil drawn from the oil sump of the crankcase, back to the oil tank.



Engine characteristics with different fuel valve settings

Engine	No. and Type of Carbureters	Carbureter Details				Intake Manifold Details						Remarks
						Main Section			Branches			
		Diameter of Airtube	Diameter of Diffusor	Section of Airtube	Theoretical Airspeed	Diameter	Sectional Area	Theoretical Airspeed	Diameter	Sectional Area	Theoretical Airspeed	
		in.	in.	sq. in.	ft./min.	in.	sq. in.	ft./min.	in.	sq. in.	ft./min.	
Rolls-Royce	2 Double	1.515	.65	1.332	18,400	1.73	2.36	11,550	1.73	2.36	11,550	2 Magnetos Old Oil Pump
Rolls-Royce	4 Old Single	1.515	.65	1.332	19,000	1.73	2.36	11,950	1.73	2.36	11,950	4 Magnetos New Oil Pump
R. R. Eagle	4 Old Single	1.515	.65	1.332	21,400	1.73	2.36	13,000	1.73	2.36	13,000	4 Magnetos New Oil Pump
R. R. Eagle	4 New Single	1.653	.65	1.837	16,775	1.73	2.36	13,000	1.73	2.36	13,000	4 Magnetos New Oil Pump
Rolls-Royce	2 Double	1.515	.65	1.332	13,720	1.73	2.36	8,560	1.73	2.36	8,560	2 Magnetos Old Oil Pump
R. R. Falcon	2 Double	1.515	.65	1.332	16,050	1.73	2.36	10,090	1.73	2.36	10,090	2 Magnetos Old Oil Pump
R. R. Falcon	4 New Single	1.653	.65	1.837	13,000	1.73	2.36	10,090	1.73	2.36	10,090	2 Magnetos New Oil Pump

The oil pump is developed as a double gear pump. The lower pump is surrounded by a wire screen of large surface, and is located in a small riveted tank, to which the oil flows from the oil reservoir above it. Above this pump is another, which returns any oil that collects in the lower part of the crankcase to the reservoir. Both pumps are driven through a worm wheel with a vertical shaft, from the worm for the camshaft drive. As the speed of rotation of this worm wheel is too high for the oil pump drive, a reduction in speed is effected by means of a small planetary gear, from whose planetary spider the motion for the pump shaft is taken. The coupling together of the two oil pumps and of these with the planetary spider is again effected by utilizing a serrated coupling whose members are so arranged that slight inaccuracy in the mounting does not cause trouble.

As regards the carbureter, the engine has undergone a number of changes in design. In the first engines two dual carbureters were used, but the newer engines are provided with single carbureters. The design of this carbureter is along the lines of the Claudel-Hobson, which type may be supposed to be familiar to the reader. The single carbureters again divide into two classes, as regards the method of altitude regulation. Whereas in the older construction the pressure in the float chamber was controlled by the Gillet-Lehman method, in the newer design a liquid fuel throttling method is used, the details of which may be seen in the drawings.

Through the introduction of this needle valve, the pressure difference between the float chamber and the nozzle outlet can be changed in accordance with requirements. Three different positions of this needle valve are on the carbureter, viz., weak, for operation at high altitudes; normal, for regular operation (which setting permits of a test stand output of 320 hp. with a fuel consumption of 226 grams per hp.-hr.) and rich. When the fuel regulator is in this latter position, the engine is capable of developing 10 per cent more than its normal output, that is, 352 hp., which output is given on the name plate as the full b.-hp.

There is no jacket on the carbureter, and in view of the fact that it is located in a well protected place, between the cylinders inside the fuselage enclosure, there would seem to be no need for one. Nor is the carbureter air specially pre-heated, being taken directly out of the body, where there is plenty of warm air, especially if the radiator is mounted between the propeller and the engine. The intake pipe is, however, provided with a jacket, which is included in the cooling water circuit. But the value of this jacket, which has only a limited heating area, would seem to be questionable. In order to be able to inject gasoline into the intake manifold, previous to cranking the engine, a nipple is screwed with the under side, for the connection of a small bore tube through which the fuel can be injected by means of a small hand pump located in the pilot's or engineer's cockpit.

Saving a Ton on the Long Distance Truck Haul

(*Continued from page* 310)

but it will fail by bending because the slenderness ratio l/r is too high. A brace was placed in the bracket, Fig. 4, which cuts the ratio in half.

The rear end overhang is supported by two brackets similar in design to the side brackets. The rear brackets support a 3 x 3 x 5/16 in. std. steel angle to which the tail gate is fastened. The rear end of the side angles are also bolted to the ends of this angle, holding the rear end very securely. Fig. 5 shows a section through the rear bracket and tail gate angle support.

The tail gate is of the same material as the floor. It is bound by 1½ x 1¼ x ¼ in. steel ties. The gate closes half the end of the body and a heavy waterproof curtain drops from the roof and completely seals the rear end.

The roof of the body was filled with glue; then a piece of 4½ oz. duck was glued on and another coat of glue applied.

There is a system of three dome lamps, which light the cab. One is placed in the cab, one in the bunk and one in the loading platform. They are all operated from the cab.

The outer sides of the body and the interior of the loading compartment are painted a battleship gray. The chassis and roof are a very dark blue. The inside of the cab and bunk are finished in cream enamel. In addition, the entire body was given two coats of Valspar varnish to further protect the plywood from the weather.

English Design and Operation of the Motor Bus

(*Continued from page* 315)

principle of construction from that of its predecessor, being of the flitch plate type with two side plates 3/16-in. thick separated by an ash filling. The left side member is, however, now much longer than that at the right side, the projection being utilized to act as a support for the loading platform of the body. Thus the body, instead of having its overhung portion suspended from the upper deck, as hitherto, has its loading platform and staircase supported by the much stronger and more economically constructed extension of the main chassis frame.

There are three cross members in the chassis, the one immediately behind the clutch being of stamped steel, while the two supporting the gear-set in the center and the one just forward of the rear axle to which the bracket of the torque member is attached are each built up according to the flitch plate system.

Exactly why the flitch plate frame is preferred by the operating engineers is not clear. It is not a question of weight saving, for it has been shown that a stamped steel frame can be made quite as light for the same strength. At one time it was put forward that the flitch plate system was more flexible, and therefore less liable to fracture; but the box-like form of the bodywork and the light construction of the new superstructure do not allow the frame flexion; in fact, the new frame has been deepened as compared with the old to prevent stress from frame deflection being imposed upon the body. The only reason given for the use of this system in this case at all is that it is cheaper to maintain and reduces the operating cost of the vehicle.

What Will Road Builders Do for the Motor Truck?

The question as to the effect of the motor trucks on our roads has often been discussed. The truck has been on the defensive. The chairman of the Good Roads Board of the A. A. A. turns the tables in the following article. The truck is a transportation agent and roads must suit it.

By George C. Diehl*

RECENTLY representatives of manufacturers of automotive vehicles have been asking the question, "What are the highway men going to do to stop the damage done by the highways to the trucks?" With equal frequency highway engineers have inquired, "How can we stop motor trucks ruining our roads?"

Inasmuch as a highway is analogous to a railroad, in that it is designed to carry traffic and all makers and users of highways must continually bear in mind that the fundamental purpose of the highways is to carry traffic, it would seem that both the manufacturers' representatives and the highway engineers should not further indulge in these inquiries, but should rather ask, "How can we build highways and automotive vehicles to best serve traffic?"

Carrying the analogy of railroads and highways still further, it is quite apparent that the railroad construction organization is disbanded after the railroad is completed, and the maintenance of way, freight and passenger traffic and many other departments are created. There is a great tendency to overestimate the construction department. Both in highways and in the manufacture of automotive vehicles there is overlooked those departments which have to do more directly with traffic. In every highway department should be a traffic division which would study the various traffic requirements and ascertain the relation between vehicles and loads and types of construction; determine the relation between areas of farm land, population and total amount invested in manufacturing plants, with present and probable future tonnage of traffic; arrange for the control of all vehicular traffic; separating, if necessary, the rapid and slow moving traffic; plan the conduct of repairs, maintenance, oiling and detours, in such a way that the inconvenience to traffic will be minimized. In short, develop an economic theory of construction for highways and automotive vehicles.

The object sought of course is to lessen the cost per ton mile of traffic movement. The first step is to ascertain the present cost and to analyze it in its various constituent parts and then by proper comparison seek to prepare plans which would cut down this cost. The cost per ton mile of necessity includes construction, maintenance and operating cost of both highway and vehicle.

A fact frequently overlooked is the unimproved condition of a vast number of miles of highways. It is essential that every mile of highway be improved, and it would appear reasonable that we start with the premise that every highway in the United States should be improved. The ideal toward which we should look is that every such highway should be so improved that it could conveniently and effectively carry a 5-ton automotive vehicle with a gross weight of 28,000 lb. at any season.

There are systems of highways which are the result of partnership between the Federal Government and the states, or the states and the counties, or the counties and the towns. During the promotion period this partnership was more or less necessary in order to produce appropriations. There appeared to be certain psychological reasons why the county would not make an appropriation unless it would be brought face to face with the proposition that if it raised a certain amount, the state would contribute an equal or greater amount; and likewise with the other political subdivisons. This partnership produced in many cases a compromise in the type, width, cost and other features of the highway which caused more or less disagreement between the authorities representing the different subdivisions, but of even greater importance, it failed to fix exact responsibility.

It would seem then that the first step would be to have fixed responsibility and strict accountability. This could be done by having three classes of highway systems: namely, a national system, state systems and county systems, each operated under the sole control of their respective jurisdictions. The national system should include a definite mileage, probably from 1 to 2 per cent of the total; the state systems from 5 to 15 per cent of the total and the county systems the remaining mileage. These county systems could be again subdivided.

The establishment of a definite national system and definite systems in each state would determine the status of the remaining highways and more quickly result in the entire improvement. If such divisions of systems were made, it would be the immediate duty of the National Government and the states to so construct their systems that they would be capable of carrying traffic, without damage other than ordinary wear and tear to either highway or vehicle, both of which would be constructed to meet the traffic conditions.

Inasmuch as larger amounts would be expended on the more important systems, it would be seen that a great bulk of the appropriations would be expended on those highways which carry the greatest number of people and the heaviest tonnage, but that the unimportant highways would not be neglected, but a character of improvement made which would insure a connection with a main highway.

Making a practical, common sense answer to the question as to the method whereby highway engineers can best facilitate traffic, I would say, create the three systems of highway—national, state and county—and supplement the construction and maintenance departments with qualified and properly designed traffic departments.

Chairman of Good Roads Board of the A. A. A.

Production Control Through a Routing Department

By means of a production control board and a pneumatic tube system a large machine tool concern is keeping all its machines running in an efficient manner. This article describes the operation of these two units in detail, and brings out some effective methods well worthy of attention.

By Norman G. Shidle

EFFICIENT methods are even more essential when demand is light than when selling is easy. Expediting production demands primary attention among automotive manufacturers. There are several factors which go to make up the entire problem, important among which is the method of routing work and dispatching orders. This phase of the work is handled with varying degrees of effectiveness in different plants, but plays a large part in determining the ultimate speed of production.

A system of routing production and dispatching orders which combines systematic planning with maximum speed and accuracy is in use at the Reed-Prentice Co. The product manufactured by this concern — machine tools — calls for numerous parts, somewhat frequent changes in production schedules and, as a result, constitutes a good test of the effectiveness of a routing system.

The genesis of an order, insofar as the routing department is concerned, is in the "Identification Tag."

The "Identification Tag," Fig. 1, bears the information from the production to the routing department that a certain lot is to be made. The data on this tag is transferred to the proper places on a "Production Record." On this record, illustrated in Fig. 2, are listed the lot number, the number of pieces ordered, and the date of order. Under the heading "Piece No." is placed the number already assigned to that standard piece. For each standard piece, certain data has been compiled as a result of observations, tests, and experiments. This includes the specific operations which must be done on that piece, the standard time for each operation, the setting up time, the machine and the department for each of the operations.

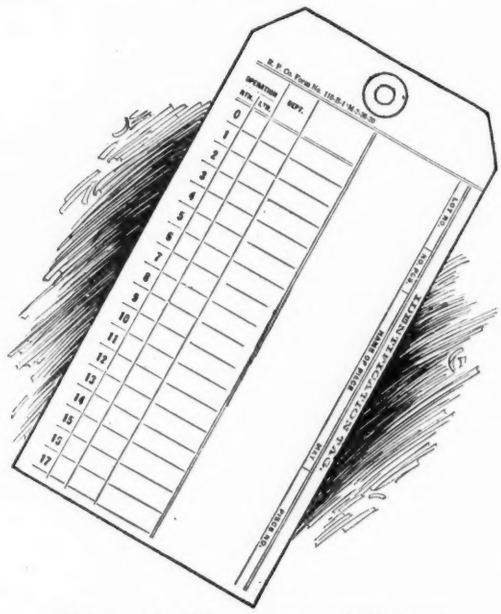


Fig. 1—Identification tag, which bears the order from the production department to the routing department

The "Production Record" is prepared as soon as drawings for any certain machine are ready and is available when a new order from the production department is sent to the routing department. In addition to this data, is the information to be recorded under the columns headed "Tool List No." and "Material List No." The tools necessary for completing each operation have been determined, the set used for each specific operation being given a certain number. This number is recorded under "Tool List No." The foreman simply sends to the tool room, refers to the tool list number, and is given the set of tools necessary for that par-

PRODUCTION RECORD

No. of Sheets
Sheet No.
Name of Piece
PIECE NO.

Piece Name and Number
Material
Pieces per Machine
Used on
Remarks

LOT NO.
Pieces Ordered
Date of Order
Replacement — Pieces / Date
Replacement — Pieces / Date
Delivered to — Pieces / Date

Op. No.	OPERATION	S. T.	S. R.	S.U.T.	Mach.	Dept.	Tool List No.	Mat. List No.	Date Fin.	Pieces O.K.	Pieces Spld.

Fig. 2—Production record, which bears standard data concerning operations on particular pieces and records progress of production

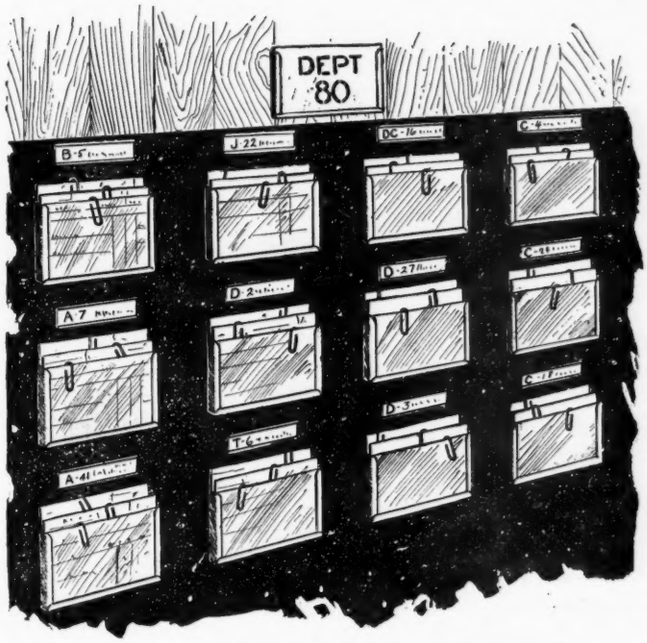


Fig. 3—Section of production control board

ticular operation. The same is true as regards the material list number.

The remaining portion of the "Production Record" is used to record the history of production on that specific lot of operations. This record, then, is prepared from orders of the production department, and serves as a basis for the operation of the planning board, illustrated in Fig. 3.

Reference to the figure will aid in explaining the details of its construction. At the top appear the numbers of the various departments, as, for instance, Dept. 80, illustrated in the section in the figure. Under this general department head are slips upon which appear a letter and a number, as J-22. This refers to a particular machine; that is, the work is routed to individual machines, thus insuring that every machine is in use at all times. Beneath the machine number are three slots, one behind the other, in which operation slips may be inserted. These slips will be described in detail later. The slips in the rear slot signify the work available or ready for that machine; those in the middle slot, the next job which is to go on the machine; and those in the front holder, the job already on the machine and in process.

The operation slips are printed in four colors—white, blue, yellow and pink—the color designating the slip for a particular purpose. The white slip is illustrated at the top of Fig. 4. The other slips are identical with it except for the words which appear in place of "Time and Bonus Ticket." In this regard the blue slip is identical, but the yellow slip bears the word "Traveler" in that place, while the pink slip bears the words "Get Ready and Planning Board Ticket." A description of how a single order is routed through will explain the uses of the various tickets, each of which measures 3 by 5 in.

To summarize in general, it may be said that:

1. The white ticket is the original ticket primarily for the workman;
2. The blue, a duplicate for the accounting division;
3. The yellow, a traveler, which follows the work;
4. The pink is a signal to the foreman to get ready for a specific job.

The data for the particular operation is transferred from the "Production Record" to the operating slips or tickets. These tickets are then filed away by the routing department.

At the time the tickets are ready to file away, the yellow "Traveler" ticket for the first operation is separated. It is attached to the identification tag and sent to the storekeeper, who immediately gets ready the material for that job. The material is then issued, the "Traveler" ticket going with the goods to the foreman of the department. He signs the "Traveler" ticket, signifying that the material has been received, and returns it by means of pneumatic tubes to the routing department.

The tickets for the first operation are then removed from the file and are placed in the rear rack of the planning board, signifying that the operation detailed on this group of tickets is available for machine J-22, let us say, as soon as that machine can handle it. The ticket groups placed in the rear rack are arranged in the order in which work is to start on them. When this particular group of tickets reaches the front of this rear rack, it is then transferred to the middle rack by itself. It is then known as the next job which is to go on machine J-22.

When the job reaches the middle slot and is about to go on the machine, the pink slip is detached and sent to the foreman. This is the "Get Ready" ticket, and advises the foreman to see that tools, materials, etc., are ready for the job. He signs this ticket and returns it to the routing department, and the traveler for the job is returned to the foreman.

When the job goes on the machine the white or time ticket is sent to the department in which the machine is located; on this is recorded the time, etc. The pink ticket remains in the front slot on the production board, the blue ticket goes to the accounting department for use in calculating the workman's premium and the cost of production.

In the department the foreman has a board constructed as shown by Fig. 5. Using the same example as before, J-22 has beneath it space for two slips—the operator's white time ticket and the yellow traveler ticket for the next job on the machine. Thus, by a glance at the board, the foreman can ascertain details concerning the work in process on any one of the machines in his department.

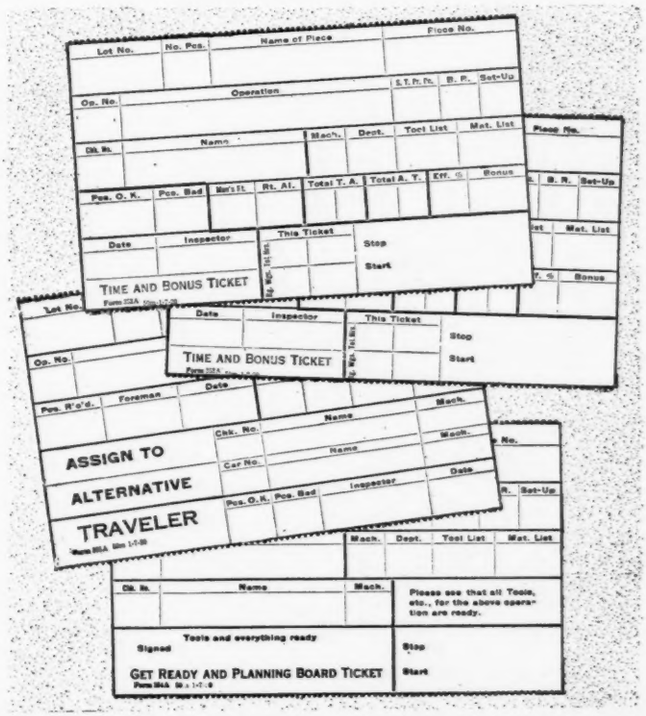


Fig. 4—Operation tickets: (top to bottom) White, blue, yellow, pink

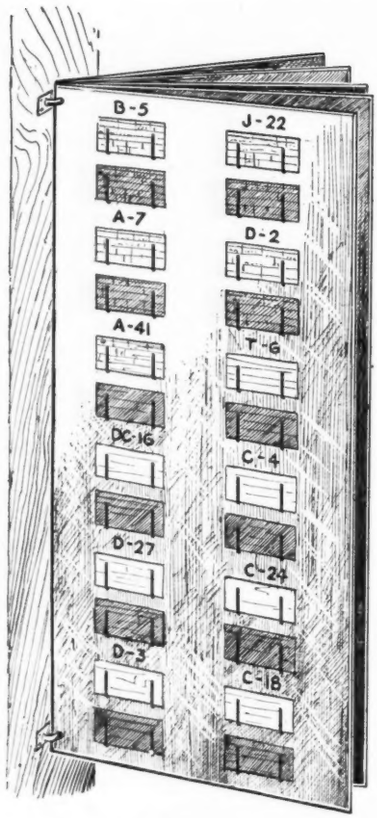


Fig. 5—Foreman's shop production control board

Having finished the job, the workman sends up his white ticket, together with traveler for next job, through the pneumatic tubes, has his time stamped on it, and receives back the new time ticket for the next job. Through the use of these tubes and the planning board—always kept up to date—this transfer is easily accomplished in about 60 to 90 sec.

The white ticket and traveler for the finished job, together with the yellow ticket for the next operation, are then sent to the inspector. He inspects the work, O. K.'s the white ticket and traveler of the finished job, and attaches the yellow ticket for the next operation to the identification tag of the new work, which then can be moved to the next department.

Thus an unbroken circuit is established which keeps production continuously flowing at maximum speed through the use of these four different colored tickets.

That this routing and planning system may reach its maximum effectiveness, it is necessary that the various slips and tickets be transported from one part of the factory to another as rapidly as possible. To have workmen walking long distances to a central point where their tickets may be stamped, to have them waiting between jobs, while a messenger boy takes in one slip and returns with another; to have any one of the innumerable little delays which are nearly sure to creep in, would mean a great lessening of efficiency.

As noted previously, all orders and tickets are dispatched by means of pneumatic tubes, which connect the routing department with each department of the shop. The tube system installed by the Lamson Co. operates with a central station located adjacent to the planning board. Fig. 6 illustrates the central tube station and a general view of the planning board. It is necessary to have an outgoing tube for every department with which communication is to be established, but one tube can handle the incoming material from several departments. The reason for this is obvious, since it is impossible for a carrier placed in an outgoing tube to select a particular station at which to stop; it must stop at the end of the tube and nowhere else. On the other hand, several tubes may feed into a main tube leading to the central station.

In the Reed-Prentice plant there are 27 departments operating in connection with the planning board and tube system. Some of these are small and adjacent to one another. In such cases, one receiving station can serve two departments. There are sixteen sending tubes from the central station and four receiving tubes. The carriers are made in the form of cylinders and are easily operated. It is possible to extend a tube to a distance of a half-mile or more, if necessary.

When a communication is sent from one department to another, it passes through the central station in the routing department, where an office boy keeps the incom-

Fig. 6—View of central dispatching station and planning board

ing and outgoing tubes constantly in operation. An indicator on each carrier shows him the department to which the message inside is directed, thus enabling him to learn its destination more rapidly and accurately than by examining the paper itself.

Since machine operators and workmen must understand and use the system intelligently, it was necessary to take some care in putting it in. The entire tube system was, of course, installed at the same time throughout the plant. It was not put into use, however, in all departments simultaneously. A start was made in one department, where the system was thoroughly explained both to the men and the foreman. After it had been operating there for a short time it was extended to another, then to another, until finally all the shop departments of the factory were included. In this way, both the production board and the shop departments were gradually worked into the new system, and much confusion, ill-will, and irritation was avoided. By the time the last installation was made, the men in the department already understood all about it from conversation with other workmen.

Through this system of production control through the routing department, the Reed-Prentice plant has been able to obtain high manufacturing efficiency at low cost and to keep up-to-the-minute record of all work available and in process on the control board or in files.

Exporting to Colombia and Venezuela

CONTINUING its survey of automotive conditions in Latin America, the Bureau of Foreign and Domestic Commerce has just released a comprehensive bulletin upon the countries of Colombia and Venezuela. As with other of the Central American countries, the Bureau has found that road conditions are the principal limitations to increased sales, but calls attention to the fact that both these countries have numerous highway projects under way and that the mileage of improved roads is constantly increasing. It further adds that the domestic production of gasoline in both Colombia and Venezuela is serving to reduce the high prices of this fuel, thus eliminating another drawback to selling.

The Bureau points out that sales thus far in 1920 have shown a tremendous increase over the similar period in 1919, in some lines being much larger than the whole of last year. Enlargement of the truck markets in the two countries is noted as a healthy indication of the increasing use of the automobile. In Colombia, for instance, the shipments of both cars and trucks for the first four months of 1920 were greater than during all of 1919. In Venezuela, the takings of trucks in the four months of 1920 were more than double that for all of 1919 and the value of passenger cars imported were practically the same for these two periods.

The bulletin of the Bureau, copies of which may be had upon application, shows that American makers practically dominate and control the markets of all automotive products. But it is rather upon the showing it makes of future sales and markets that the bulletin should interest the American manufacturer. It reveals that use of the motor bus is becoming more and more widespread and suggests further development of this phase. Both countries are lacking in railroad lines and railroad equipment; consequently, the tendency to open passenger, and likewise freight, transportation lines using automobiles and trucks, is a natural one.

"The Department of Bolivar," states the report concerning Venezuela, "according to a report of the American vice consul at Cartagena, lends itself readily to the use of automobiles and tractors and road-building materials are easily accessible. This country is heavily wooded, and it must be cleared by natives who cut out the vines and underbrush, felling and burning the large hardwood trees. A few tractors have been introduced to work this rich land and the plans for more extensive rice and sugar production make this a promising field for motor cars and machinery.

'Cartagena offers opportunities for greatly increased sales of automobiles. The largest market for motor cars is Bogota, the capital of Colombia, the registration in that city in 1919 having reached 237. Barranquilla was second with 150 cars, Cartagena third, Cali fourth and Medellin fifth. The vicinity of Calli was estimated by Trade Commissioner P. L. Bell as the most active market for motor cars and trucks, on account of the enlarging stage service in that section. Last year, 56 cars were operated as stages, most of these cars being of the medium or low-priced type.

"Local Colombian firms act as agents for American automobile manufacturers and they usually sell cars on time payments, requiring $500 cash and from $50 to $100 a month on cars selling at $1,500 and $1,800. All the automobiles in use in Colombia are of American make, with the exception of a few French and Italian cars imported before the war."

The statement is made from Cartegena that cars received from the United States have usually arrived in a satisfactory condition. However, it is added that the greatest care should be exercised in crating them, as freight service is such that poor packing will result quickly in great harm.

Concerning Venezuela, the following statement is made:

"Caracas is considered the best place for the location of a general agency, since the capital is the center of the automobile business, about half the cars imported into Venezuela being used in or near that city. Sub-agencies might be profitably placed at the ports of Maracaibo and Puerto Cabello, which receive some direct imports and which supply goods to merchants in the interior. The most important cities supplied from Maracaibo are San Cristobal and Trujillo, while from Puerto Cabello the largest interior town is Valencia, and from Caracas the chief point is Ciudad Bolivar, near the mining region.

"Throughout Venezuela, the most popular car is the five-passenger standard American automobile, which retails at prices from 50 to 100 per cent higher than those in the United States. The lowest priced cars are in the majority, although a few medium and high-grade cars are sold. One of the circumstances which promise a larger field for automobiles in Venezuela is the increasing local production of gasoline and the reduction in the price of this fuel as a result of the competition between the domestic and imported article."

Import duties into Venezuela are $0.69 per 100 lb. gross weight, on cars and trucks; $3.43 per 100 lb. on motor cycles, and $10.28 per 100 lbs. on parts and tires. Shippers are warned not to include extra wheels with shipments of automobiles, as such extras would cause customs fines. The duties in Colombia are given as $0.49, American gold, per 100 lb. gross weight, including all surtaxes, on cars and trucks; $2.43 per 100 lb. on motorcycles and $0.97 on tires and parts. "All costs of shipping, entry, etc., from the factory in the United States to the salesroom in Colombia may be estimated for an average size car at $300," the bulletin adds.

Future of South Africa as an Automotive Market

Despite a lack of roads and the high price of fuel, 30,000 cars are in service in 400,000 square miles of territory and as prejudice of the farmers is overcome, sales must go forward in large numbers.

ONE month ago when James D. Campbell of the firm of William Campbell, Johannesburg, one of the largest distributers of American automotive vehicles and equipment in South Africa, left Johannesburg, no dealer in practically all of the Union of South Africa had cars for immediate delivery and there was no indication of any decline in the unprecedented demand for motor cars. The very great demand for motor cars in that country is largely due to the fact that the entire country is enjoying prosperity and has more money than it ever had before. Farmers have gotten such high prices for their produce that they are literally rolling in wealth.

Previous to the world war in 1914 the Union of South Africa was just recovering from the Boer war of practically fifteen years previous. They had been fifteen lean years and the world war, instead of impoverishing the country as did the Boer war, literally enriched it. South African dealers do not book orders months in advance, as has been the custom in this country, but generally when shipments of cars are received they are rapidly moved off the salesroom floor. Approximately 50 per cent of all cars sold in the Union of South Africa are Fords, and the big sale of these is to the Dutch farmer. Farmers are also buying cars such as Chevrolet, Dodge, Studebaker and Hupmobile. The higher priced cars are sold in the towns and cities.

So financially healthy is the country, according to Campbell, that very few cars are sold on time, which fortunate condition has come about in the last two years. Previous to the war, and during the early part of the war, approximately one-half of all cars sold in the Union of South Africa were sold on time. Trading of used cars in on the purchase of new cars is confined to approximately 35 per cent of new sales.

Poor Road Policy

Unfortunately road improvement in the rural sections of the Union of South Africa is practically unknown. The Dutch farmer is very much averse to improvements of that character. He takes little interest in the appearance of his car and one day takes pigs to market in it, the next day sacks of wheat, he hauls groceries home in it and on Sunday takes his family to church. He binds it together with wire instead of having it repaired and never washes it.

Motoring through the country is greatly interfered with because the trails or roads pass through private areas and gates have to be opened and closed. The law of the country is that gates that swing freely must be fitted, but very frequently wire is stretched across the road and great difficulty is experienced in opening the so-called gate. The antipathy of the Dutch farmer to the motor car is rapidly disappearing, however. In Natal, the English colony, there are no gates and all roads are signboarded and a progressive road policy is under way.

According to a cable received by Campbell a few days ago there is a very acute gasoline shortage in his home country. This is due largely to the fact that the British Imperial Oil Co. has lost three tankers in the last year, and its last tanker which arrived in Delagoa Bay was in flames but fortunately the cargo was saved. Coupled with this is the fact that Texas and Vacuum, the two American companies selling gasoline, have not been shipping enough into the country.

To make matters worse the motorists of Johannesburg in the last few months banded together to beat the street railway company employees, which have gone on strike no less than three times. The motorists organized the city for motor transportation, and this pretty largely took the surplus of 300,000 gallons of gasoline which was in storage. Gasoline has been selling to the trade at 35 shillings 9 pence and retailing at £2 per case, containing 8 Imperial gallons, in Johannesburg. All gasoline arriving in the country still arrives in cases containing two 4-gallon cans.

In cities like Johannesburg practically all the garages have Bowser or Wayne pumps. The garageman empties the fuel from the cans into his tank and then sells the empty cans for 25 cents each. Storing the gasoline in this way permits a lower insurance rate and also makes selling of it easier. In pre-war days gasoline sold at £1 per case of 8 gallons as compared with £2 to-day. In pre-war days dealers were content with a profit of 6 pence per case, but now they are getting a profit of 6 shillings per case by putting it in the tanks. One reason why the Union cannot change entirely to a bulk basis of handling gasoline is that the railroads, which are government owned, have not an equipment of tank cars for transporting the fuel. The only tank car equipment they possess is that for moving supplies of water to different sections. The railroads, being government owned and operated, cannot cope with the demand for coal and other freight cars and are not prepared to build new cars. A further handicap to the introduction of bulk methods is that there are no tank storage facilities for gasoline at Cape Town or other ports. The only tank storage is that for crude oil, which is owned by the British Imperial Oil Co.

Motor trucks are making very slow progress in South Africa largely due to the high cost of fuel. There are very few of the lighter vehicles such as 1-ton. Campbell believes that the solution of the truck movement in a country like the Union of South Africa, which is so tied up with the fuel problem, is an adoption of the Diesel or semi-Diesel engine which will use heavy oils. In Cape Town the electric truck in 2-ton size is popular, owing to the low price of electrical current. All of these trucks are American.

In Johannesburg mail collection from street boxes is by Milburn 750-lb. light electrics. A fleet of them is used. The streets are all well paved.

From a point of view of the future possibilities of selling motor equipment in the Union of South Africa there is no doubt but that as in all great agricultural areas the demand will rapidly increase. The total white population of the Union is 1,421,781 and this is scattered over an area of 400,000 square miles, thus giving a white population of a little over three people per square mile over the entire area. The colored population is 7,000,000. Up to the present the colored population is not a potential buying factor excepting in Cape Colony, which is the only section of the Union in which the colored race has been granted franchise.

The rule of the road in South Africa is to drive on the left and naturally right-hand steering is required. At present there are 30,000 motor cars in the Union of South Africa. Campbell says that carburetion is one of the problems in cities like Johannesburg, which is located at an altitude of 6000 ft., where the mean average temperature is 86 deg. and there is no humidity. Campbell speaks with authority on this subject as he has been in the motoring business for sixteen years, and the interests of his organization are scattered over the entire Union.

Gasoline distribution is so general that it can be purchased in every little village throughout the Union and small stores on the veldt or plains. The trip from Cape Town to Johannesburg, 1000 miles, requires five days to make it in comfort with a motor car. This route was recently covered by the new Overland 4 in forty-eight hours. It is not a road but really a trail over the veldt.

From Cape Town to Port Elizabeth, on the southeastern coast, a distance of 400 miles, the roads are more improved, being covered in places with iron-stone gravel. From Johannesburg to Durban, 400 miles, the roads are trails. Where roads lead through mountain passes, they are covered with gravel mixed with a clay binder.

Throughout the Union, the dry season generally begins the end of April and continues until mid-September, during which time there is scarcely a rainstorm. The wet season continues through November, December, January and February. In this season the rains are generally in the afternoons and continue two or three hours.

During the war all forms of motor contests were discontinued throughout the Union, but in the last few months such contests as hill-climbing, fuel economy, and reliability runs are being revived. These are largely handled by three important automobile clubs, the Transvaal Automobile Club in Johannesburg, which is the largest; the Royal Automobile Club of Cape Town, and the Natal Automobile Club at Durban.

In Johannesburg there is rarely any snow, slight falls having occurred only three times in the last fifteen years. Car selling continues throughout the entire season and the usual winter problems do not exist in the Union.

All tires are sold with a guarantee on mileage, with the exception of Michelin.

Motorcycling is developing rapidly.

Commercial Development Shown in Olympia Aero Show

(*Continued from page* 307)

cylinder at the bottom of the piston travel. The method of control for altitude is ingenious, and consists of a device in connection with the exhaust cam, by which this valve is partially opened during the suction stroke at altitudes below 12,000 ft. The compression ratio can thus be varied from 4.5 to 1 at ground level up to 7 to 1 at 12,000 feet, and it is claimed that the introduction into the cylinder of a volume of air at the beginning of the suction stroke entirely eliminates all possibility of back-firing.

The manufacture of the Cosmos air-cooled static radial engines (also recently described in AUTOMOTIVE INDUSTRIES) has now been taken over by the Bristol Aeroplane Co. Two types are being made, of which the larger has nine cylinders and is rated at 450-500 hp. It is made either geared or ungeared, in the former case with an epicyclic reduction, and has a bore of 5¾ in. with a stroke of 7½ in. The weight per horsepower of the ungeared motor is 1.55 lb. The cylinders are steel with aluminum heads. There are four valves per cylinder and these are operated by external push rods. The balancing of the master connecting rod is an innovation. In order to balance the inertia forces on the crankpin and allow the latter to be made comparatively small, two bob weights are fitted to the big-end housing of the connecting rod. They are in point of fact similar to a pair of small connecting rods and are carried in slides on the cheeks of the crank webs. The faster, therefore, the engine runs, the greater the inward pull on the master connecting rod, with consequent relief of pressure to the inside of the big end. A second Bristol Cosmos engine is the three-cylinder Lucifer. In general construction this is similar to the other, but it does not contain either the special induction pipe device nor the master connecting rod balance weights. This engine is rated at 100 hp.

Other engines exhibited are the Clerget, the Beardmore, the A.B.C., the Anzani and the Hispano-Suiza, but none of them calls for special comment.

In conclusion may be mentioned the immense exhibit of the British Air Ministry, which includes every conceivable thing associated with the administration of both lighter than air and heavier than air craft. It embraces wireless, signaling, direction finding and telephoning, aerial lighthouses, maps, inspection and testing gear, bombs and bomb sights, guns, etc.

Discussion of the Car Census of Argentina

On these pages Mr. Beecroft brings to bear additional data as an amendment to the obviously incomplete tabulation of this South American country in the Bureau of Domestic and Foreign Commerce recently published. Previous figures, as then noted, included only six districts.

By David Beecroft

THE world statistics published in the July 29 issue of AUTOMOTIVE INDUSTRIES, as compiled by the American consular agents for the Bureau of Foreign and Domestic Commerce, are so incomplete as to be misleading unless carefully analyzed by the American manufacturer and exporter. The statistics are complete as to certain consular districts, but so many districts are missing that the totals by countries are not entirely representative. In some countries some of the largest car centers have not been included. Because of this these totals cannot in any sense be accepted as world totals. With some countries the figures may represent an accurate total, whereas in others the totals are far from the correct ones. It would be unfortunate if they were construed as such, as the Bureau of Foreign and Domestic Commerce intended them as a compilation of available figures extracted from consular reports received during the last year or so, and not as complete world totals.

Take Argentina as an example of how far from the accurate totals are the figures published. Six consular districts in Argentina gave a car population of 779, whereas there are very nearly 40,000 or perhaps more cars in that Republic. If we take our own government export figures on motor cars to Argentina from 1907 up to and including May, 1920, we have exported to that country 20,672 passenger vehicles and 640 motor trucks, not including Ford vehicles. Ford exports do not appear in our export reports as cars, but are listed as parts, so that our export figures to that country must always be read as not including Fords.

We have no definite figures on the number of Ford cars in Argentina, but the Ford Motor Co., Export Dept., has assured us that in the year August 1, 1919, to August 1, 1920, parts for approximately 15,000 Fords were shipped to Argentina. How many equivalents of Fords have been shipped from midsummer 1915, when Ford started his active selling campaign in Argentina, to August, 1919, cannot be given at this time, but it was estimated by Argentine distributers in December, 1919, that one-half the cars in Argentina then were Fords. It is a matter of regret that at this time we cannot give the complete total of Ford exports which, if added to our government figures, would give accurate figures on our total exports to Argentina.

We are, fortunately, able to print herewith official Argentine government figures of European cars imported into Argentina from 1905 to 1919, which make a total of 15,161 vehicles. Very few of these vehicles have been exported from Argentina as shown by the official government figures of Argentina imported from Europe as follows since 1905:

Year	Number Motor Vehicles
1905	334
1906	678
1907	547
1908	451
1909	677
1910	1377
1911	1972
1912	3573
1913	3819
1914	1333
1915	167
1916	56
1917	98
1918	30
1919	49

Exceptionally complete figures on Argentina's imports are contained in a recent report from Consul-General W. Henry Robertson of Buenos Aires, which shows that during 1905 up to September 30, 1919, Argentina imported a total of 46,989 automobiles. Mr. Robertson's figures unfortunately do not appear in the statistics published July 29, as they were not received in time. The tabulation follows:

ARGENTINE IMPORTS, BY COUNTRIES, OF MOTOR CARS

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	First 9 Months 1918	First 9 Months 1919
Austria	..	2	..	..	..	..	3	1	3	..	..	..	..	..	..
Belgium	1	5	15	5	19	73	159	295	302	90	18	13	4	..	..
Brazil	..	..	..	..	..	1	..	..	5	..	..	..	..	1	..
Canada	..	..	..	..	..	..	..	..	..	..	..	..	50	..	..
Chile	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
France	263	433	368	305	336	695	894	1651	1830	987	68	24	12	10	6
Germany	28	162	72	37	39	164	301	627	761	122	13	2	..	..	..
Italy	9	26	53	43	150	234	306	422	425	139	43	31	29	13	1
Paraguay	..	..	..	..	..	..	..	..	..	..	..	..	2	1	..
Spain	1	5	4	4	9	7	19	29	11	..	..	..	3	1	7
Sweden	..	..	..	..	..	..	4	..	..	..	..	..	..	..	..
Switzerland	..	1	4	4	7	23	22	45	60	..	..	..	..	..	..
United Kingdom	39	39	40	51	113	162	230	451	412	88	47	13	4	26	23
United States	43	34	53	44	154	204	489	708	1296	723	1640	5846	10930	5869	2837
Uruguay	2	5	1	1	3	6	27	43	2	..	..	..	1	5	9
Other countries	..	..	..	1	1	11	7	9	8	36	18	13	6	..	..
Totals	377	712	610	495	831	1581	2461	4281	5115	2185	1847	5929	11031	5926	2886

Consul-General Robertson goes on to show in his report that at the end of 1919 there were registered in the city of Buenos Aires 11,800 motor vehicles, made up as follows:

Private motor cars	5,902
Motor cars for hire	4,802
Motor trucks	745
Motor delivery wagons	60
Motor cars free of license	270
Official automobiles	17
Electrics	4
Total	11,800

These statistics are given so that our readers may better decide for themselves the present motor population of Argentina. Lack of sufficiently complete figures for other countries in the world prevent us publishing more figures, except that we do take the liberty of publishing herewith a tabulation showing our exports of passenger cars to 22 Spanish-speaking countries and two Portuguese-speaking countries. These figures do not include Ford vehicles and we are not in a position to give any definite estimate on them. These exports are from 1907 to May, 1920, and show a total of 112,859 passenger vehicles, and 11,272 trucks, or a grand total without Fords of 124,131 vehicles.

U. S. A. EXPORTS TO SPANISH AND PORTUGUESE COUNTRIES
1907 TO MAY 31, 1920

Countries	Cars	Trucks	Totals
Argentina	20,672	640	21,312
Portuguese Africa	277	29	306
Bolivia	365	56	421
Brazil	11,053	1,052	12,105
Cuba	18,742	2,815	21,557
Chile	8 873	502	9,375
Colombia	1,417	108	1,525
Costa Rica	431	23	454
Dominican Republic	1,136	143	1,279
Ecuador	665	20	685
Guatemala	438	22	460
Honduras	171	33	204
Haiti	486	35	521
Mexico	12,639	2,175	14,814
Nicaragua	260	29	289
Panama	1,327	237	1,564
Peru	2,759	725	3,484
Porto Rico	200	...	200
Philippine Islands	8,670	1,213	9,883
Portugal	3 976	456	4,432
Paraguay	185	...	185
Salvador	384	19	403
Spain	6,859	618	7,477
Uruguay	8,491	108	8,599
Venezuela	2,383	214	2,597

Comparative Tests of Still and Diesel Engines

ABOUT a year ago considerable publicity was given in the British engineering press to a new engine known as the Still, which combined steam with the internal combustion principle. It was claimed that this had an even higher thermal efficiency than the Diesel engine, which had been the most efficient prime mover up to that time. Now the results of some comparative tests have been made public by William Denny, in a paper read before the Institution of Naval Architects. Mr. Denny is a member of the firm of Wm. Denny & Bros., who in 1913 took out a license from the firm of Sulzer Bros., of Winterthur, Switzerland, for their special type of oil engine. To obtain experience in the manufacture of such engines, they arranged to proceed with small twin screw engines of about 250 i.h.p., and to build a hull in which these engines could be thoroughly tested. When war broke out, the hull and engine for this experiment were well advanced, but under "control conditions," the work on them was stopped.

For some time before the war the firm had been interested in the Still engine. Fairly early in the war period, with the consent of the Admiralty, an experimental Still installation to correspond with the hulls already mentioned was made. The arrangement was carried out and the vessel with the Still engine was exhaustively tried.

On the conclusion of the war, it was decided to complete the original set of Sulzer engines and fit them to the same hull—the Still installation, so far as necessary, being, of course, removed from the vessel. This experiment, also, was carried out and the results presented in the paper.

Mr. Denny gives in his paper indicator diagrams taken from the Sulzer engine and from the internal combustion end and the steam end of the Still engine. Both the Sulzer and the Still engines work on the two-cycle principle. With the Sulzer engine, a mean effective pressure of 90.6 lb. per sq. in. was obtained; from the internal combustion cylinder of the Still engine, 90.0 lb. sq. in. and from the steam cylinder 9 lb. at the top end and 10.0 lb. at the bottom end. Graphs were shown giving the thermal efficiency based on the indicated horsepower and the thermal efficiency based on the shaft horsepower, as well as graphs showing the fuel consumption in pounds per hour and per horsepower hour, and the indicated horsepower and shaft horsepower at different speeds of revolution.

In the tests the same grade of fuel, viz., fuel shale oil, with a specific gravity of 0 85 at 60 deg. Fahr., and a calorific value of about 19,000 B.t.u., was used in both engines. The thermal efficiency on the shaft horsepower basis was higher for the Sulzer engine up to a speed of 208 r.p.m., at which speed it was equal to about 26 per cent. From this speed up to 243 r.p.m., the thermal efficiency was higher for the Still engine, attaining its maximum value of 30.5 per cent at 235 r.p.m. Beyond 243 r.p.m. the thermal efficiency was higher for the Sulzer engine, and at the maximum speed to which the curve for this engine extended, 250 r.p.m., the thermal efficiency on the shaft horsepower basis was slightly greater than the maximum for the Still engine.

In view of the fact that the Still engine with its special accessories and boiler weighed 29 tons, as compared with only 25 tons for the Sulzer installation, and the fact that the Still installation, being virtually a dual powerplant, undoubtedly costs considerably more to manufacture. It seems unlikely that the Still engine will oust the Diesel.

Rust Proofing Ferrous Metals

A NEW rust prevention compound which would appear to fill a long-felt need has been demonstrated in New York by H. C. Wilson, who, in association with W. H. Buell, is the discoverer. The compound has a petrolatum base and is designed to accomplish what many shippers of ferrous metal machinery and equipment are trying to do with plain petrolatum or compounds now on the market.

The objection to the present products is that they do not withstand sufficient heat and are removed when the articles stand long in storage where the temperature runs above 100 deg. Rust develops. This was one of the difficulties in the shipment of arms and machinery during the war and this discovery is due to the experiences of Messrs. Wilson and Buell in war work. In the demonstration of this compound, known as "Stazon," it was shown on an electrically heated steel plate that petroleum and some other compounds melted at 110 deg. or less, while this compound was intact at 200 deg. and held above that figure. It is said that it can be manufactured at a price to rival the present unsatisfactory rust preventatives and that it can profitably be used for protection of all ferrous metal surfaces in shipment and storage, whether in heated storage sheds or in the open. The Conversion Products Corp. will manufacture the product.

Drawing Air Through the Crankcase in Tractor Engines

Editor AUTOMOTIVE INDUSTRIES:

IN the hope of stimulating constructive thought and perhaps experimental work, may I continue the discussion reopened by Mr. Ochtman, on the general subject of crankcase dilution and ventilation?

It is undoubtedly true that only the heavy ends of the fuel find their way into the crankcase to dilute the oil, and that the boiling points of these fuel fractions undoubtedly are materially higher than any normal crankcase temperature. It must be remembered, however, that as regards evaporation into air under conditions of long and intimate contact, the boiling point of the liquid is not so important as its vapor pressure. It was pointed out in calculations published over a year ago in AUTOMOTIVE INDUSTRIES that a properly proportioned mixture of ordinary kerosene and air would have a saturation temperature of approximately 220 deg. Fahr. Inasmuch as the saturation temperature decreases with the proportion of fuel to air, it is obvious that for the small proportion of the fuel which escapes from the combustion chamber into the crankcase the saturation temperature would be very much lower than 220 deg. providing that the volume of air passing through the crankcase is equal to the volume of air passing into the cylinders, the condition that would obtain if the carbureter intake were supplied from the crankcase.

Under present conditions, in which the air in the crankcase is practically unchanged through long periods of engine operation, or worse yet, is replenished by leakage of gas past the pistons, it is easy to see that at the crankcase temperature the crankcase atmosphere soon becomes saturated with fuel vapor, after which condensation rather than evaporation will be the thing which occurs.

Regardless of the lubrication system followed, any modern engine will have its crankcase atmosphere filled with rapidly moving particles of oil, due to the splash or the throwoff from the connecting rod ends, as the case may be. This condition affords the large surface area and relative motion between oil particles and air which will facilitate either evaporation or condensation, depending on which action is made possible by the relation between the fuel-to-air proportion and the temperature. Furthermore, it must be borne in mind that the fuel which enters the crankcase does so by passing between the cylinder wall and piston, and is of necessity at the highest temperature attained by oil anywhere in the lubricating system, thus being in an ideal condition for the fuel mixed with the oil to be evaporated out of it by suitable crankcase ventilation.

In addition to the foregoing considerations, the oil in the crankcase need not be, as assumed in Mr. Ochtman's discussion, at a low temperature. Under winter conditions it would be not only possible but desirable to warm the air passing into the crankcase by drawing it off the exhaust pipe or manifold. For winter running this would simplify the problem of securing an oil of sufficiently low cold test to meet operating conditions. In summer such heating would presumably be undesirable and could be dispensed with in the usual manner. It might be argued that there would be undesirable complication in passing the air from the crankcase through a hot-air stove and then to the carbureter. It is likely, however, that if a hot-spot manifold were used, the air as received from the crankcase would be sufficiently warm without additional heating, and in support of this view I may say that I have operated a motor car with entire satisfaction in zero weather with no heating of the carbureter intake air other than that produced by its passage through the radiator, the mixture passing from the carbureter to the cylinders through an exhaust heated manifold.

My reference to the entrainment of oil mist in the air stream was not intended to be taken as a serious difficulty but rather as a simple condition to be met. There is reason to believe that this separation could be effected to a satisfactory degree by simple centrifugal separator. Inasmuch as the circulation of oil in the crankcase is so rapid, there is no reason to believe that the oil caught in the separator would contain appreciably more fuel than that remaining in the crankcase, and consequently the oil so separated should be returned directly to the crankcase. Drawing the air from the higher and less turbulent portions of the crankcase, would, however, avoid most of the larger globules of oil.

As I see it, the real difficulty to be solved in connection with the contemplated method is that of cleaning the air admitted to the crankcase sufficiently well so that the amount of dust entering the crankcase shall be as little or less than that now entering through the ordinary breather opening.

The connection of the crankcase breather to the carbureter air inlet as suggested by Mr. Ochtman is undoubtedly satisfactory as a means of preventing entrance of dust to the crankcase, but it provides only a vent and does not provide for ventilation of the crankcase by a stream of air equal to that inhaled by the cylinders. This method is, I understand, employed on the engine of the W-S-M tractor.

W. B. JONES,
The Power Farming Press,
St. Joseph, Mich.

Book Review

MOTOR Boats and Boat Motors by Victor Page and A. Clark Leitch is a hand book for the small boat owner who does not know much of the subject. It is intended to give him an understanding of the construction and operation of his craft.

It is divided into two parts. The first part takes up the hull and its fittings, operation and design. The second part takes up the power plant and its auxiliaries. The last chapter is devoted to seaplanes and flying boats. A brief description of the various leading types of planes and engines is given, as well as a resume of the theory.

GRIPPER AND SIDE GUIDEDAY

Marked Progress in the French Industry

Manufacturers are making a showing on their after war programs and new lines of work are well outlined. Berliet announces a new car and Citroen adjusts price. Increases in capital are announced by a number of well known factories. Novel features in car announced by Pilain.

By W. F. Bradley

PARIS July 24.

THE Gnome & Rhone Aviation Automobile Co. is now in full production and has shown a net profit of $433,118 for the year 1919. During the war the firm had three factories, two of them being in Paris and the third at Lyons. This latter has been closed and activities concentrated on the two Paris factories.

All war contracts were cleaned up in 1919, and the first automobile work to be taken up was the construction of a series of chassis for the Rolland-Pilain Co. Up to the end of the year 160 of these had been delivered. At the present time the Gnome & Rhone Co. is getting into production on a series of chassis for the Piccard-Pictet Co.; it got into production on motorcycles for the French A. B. C. Co. in May of the present year, and is also building engines for the Mathis Automobile Co. of Strasbourg. These latter have been delayed by reason of irregularity in the arrival of raw material. In March of this year production was begun of Aurore agricultural tractors.

The Gnome & Rhone six-cylinder automobile, which was shown at the last Paris salon, is not yet in production. In addition to automobile work Gnome & Rhone is preparing to produce semi-Diesel engines of 40 to 100 hp. The first of these is now under test and production will begin in two or three months. It is also intended to build Hele-Shaw pumps, according to the English patents; sewing machines and textile machinery are in production.

New Berliet Factory

Berliet's new factory at Venissieux, near Lyons, is nearing completion and work has already begun in many of the shops. This new factory is quite distinct from the old establishment. The site has an area of 6,000,000 sq. yd., of which 2,400,000 sq. yd. have been built on. It comprises steel foundry, stamping shops, machine shops, and an assembly hall 380 yd. in length, where trucks are now being assembled on the American conveyor system. A similar assembly hall is being completed for the new 15 hp. passenger car, built on American lines, and for which deliveries are promised for early next year. The price of this car has been fixed at 25,000 francs, or $5,000 at nominal exchange. Berliet is building thirty trucks daily, but demand having dropped off considerably during the last few weeks, he has a stock of about 1000 ready for delivery. It is rumored that negotiations are in hand for the sale of all of these to the Polish Government.

Citroen has increased the price of his passenger car from 18,000 to 20,000 francs ($4,000), but has made himself responsible for the payment of the luxury tax which is still imposed in France on all automobiles, so that the actual increase to the client is only very slight. During the past few weeks there has been a slackening off in the demand for private cars, and the impression is gaining that a cut in the present almost artificial prices is likely to be made before long. No relief is to be expected by reason of the recent decree permitting automobile importations, for with a duty of 45 per cent ad valorem and a disadvantageous exchange rate, foreign cars are not in a position to compete with the French product. The only country which could relieve the situation is America, for neither England, Italy nor Belgium are in a position to send cars into France.

The report is current in Paris that as the result of official complaints lodged against the Salmson Aviation Motor Co., by the stockholders in that concern, legal proceedings will be instituted under the incorporated societies' law.

White Agency

A French White Automobile Co. has been registered with a capital of $400,000, its offices being at 63 Avenue des Champs Elysées, Paris, The object of the company is the sale of White automobiles and the manufacture and sale of spare parts for these cars. The board of directors is composed of Charles Mendl, Lucien Périssé and Eugène Strauss.

The Zedel Automobile Co., with a factory at Pontarlier, on the Swiss frontier, has been re-registered as a French concern under the French company laws. By September of this year the output will be 5 chassis daily, with an increase to ten daily by the middle of next year. The change from Swiss to French laws has been made owing to the difficulties the factory experienced in getting supplies of raw material when registered as a foreign company. The Zedel factory has available almost unlimited hydraulic power, and therefore is largely independent of the present coal shortage.

Increased Capital

Numerous increases in capital are announced by French automobile concerns. Lorraine-Dietrich has increased its capital from $4,600,000 to $9,400,000. Berliet has issued 50,000 6 per cent bonds of $100 each; Th. Schneider, 5000 bonds of $100 each; the Charles Blum Co., builders of Latil tractors, has issued 12,000 $100 shares and 14,000 bonds of $100. The Rochet-Schneider Co. has increased its capital to $1,740,000, and the Zenith Carbureter Co. has made an increase to $1,344,000.

The Pilain Co., of Lyons, has made an increase in capital of $600,000. This company is preparing to bring out a new car in which compressed air will be used for starting, for inflating tires, and for jacking up the wheels. The Bergougnan Tire Co. has opened a Belgian branch with a capital of $4,000,000, and the French Dunlop Tire Co. has increased its capital from $3,000,000 to $7,500,000.

GRIPPER AND SIDE GUIDEDAY

The Pursuit of Labor Peace Demands Patience and Understanding

In working out the sound principles and human policies that mean co-operation between management and workers, Mr. Tipper sees that many such efforts have failed because the employers themselves failed to carry out their plans in the full measure necessary for eventual success.

By Harry Tipper

IT is a fundamental fact that a sound principle patiently pursued will develop improvement in spite of the traditions and prejudices and in spite of the insufficiency of its application. It is for this reason that many different experimental developments in practice, in the relation between employer and employee, have resulted in improvements which agree in the results or the tendency of the results, even where the methods themselves are quite different.

It is this which must be borne in mind in the study and experiment established in the hope of bettering the relations between worker, management and capital. If these experimental developments are started on the principle that there must be an agreement, a sense of mutual responsibility, a mutual understanding and an opportunity for the worker to develop his initiative and his brain in connection with his problem, the exact method by which it is approached is not of very great importance. In fact, the variety of experiments which is proceeding at the present time will be of great value in permitting a comparison of practice when these experiments have had a sufficient length of time to allow some estimate of their value.

The elaborate political system of legislative machinery known as the House and Senate plan has been successful in a number of cases. Strikes have been avoided and an entirely new attitude produced between employer and employee by intelligent education of the worker on production methods and their possibilities and by an intelligent and orderly encouragement of his participation in the development of this improved practice.

Some establishments have been able to increase the production and improve the quality without any changes in organization, except such changes as come out of the spirit of approach on the problem. We are apt to forget that the worker usually has little sense of responsibility toward his job, and neither the work itself nor the method of industrial organization has been concerned with the development of that sense. We are apt to forget that participation in the development of improved production practice and participation in the decision in respect of the conditions of his work is not a matter that can be decided in order to satisfy labor but a matter to be determined upon carefully, because it is the only way to provide the worker with an interest in and a sense of responsibility toward his work. So long as the worker has no part in the decision as to the practice of production, he cannot feel any responsibility for the outcome of that practice.

Despite all that has been said about the demands of the trade union and despite the fact that under ordinary circumstances these demands will continue to be for shorter hours and more pay, there are a number of well-established instances which prove the possibility of getting the unions and union leaders to change their attitude on production, to welcome new practices and to co-operate with employers engaged in improving their production, when these matters have been so arranged that they allow the worker to exercise his intelligence and his knowledge of practice in the development of the solution of the improvement.

It is a sound principle that the individual industrial establishment is a unit and that its workers, management and subordinates alike are more concerned with their particular common object than they are with any other affiliations. It is a sound principle that a worker cannot maintain an interest in his work unless that work demands continued mental development and continued improvement in the practical application. It is obvious that a sense of responsibility cannot be developed or even maintained where there is absolutely no participation in the decision or where there is no participation in the results of the work. If to this be added the truism that ignorance breeds suspicion, the principles enunciated in the foregoing will explain largely the lessened interest in the work, the strength of the demand for shorter hours and the general tendency away from the spirit of craftsmanship which originally entered into the production activities to such an extent.

The human factors which affect production are always at work. Consciously or unconsciously, they enter into every action and either improve or work to the detriment of the production result. The action of these factors is not dependent upon any particular system or method of organization and the most elaborate system is likely to prove a failure unless the understanding of the principles is involved in its operation.

It is unfortunate that the work which has been done by various companies and individuals, in widely separated lines of industry, cannot be brought together and examined in its relation to practice and in its suggestion for future development. The results are so widely scattered, however, and so few of them have been regarded that it will be some time before such a picture can be drawn. All that can be done at the present time is to take an available example and indicate the suggestion which it offers in respect of its development and results.

Practically all experimenters in this direction are agreed that, if we are to avoid the difficulties which have been encountered in European countries, we

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must begin with the individual industrial establishment and secure within that establishment the proper unity of purpose in regard to the work which is before the management and its subordinates in that place.

This is a sound basis from which to start in considering the development of industrial relations. In trades where the shops are generally thoroughly unionized this has been done already, in some through patient work with the local unions and arriving at an understanding with the committees of those unions concerned in the particular establishment. In cases where the establishments are not strongly organized, success has been secured more readily by the development of special machinery within the organization to bring about improvement in these matters. Many manufacturers, in strongly organized industries where their establishments are likely to run almost 100 per cent union, have hesitated to deal with this matter from the standpoint of the establishment through fear of the attitude which will be taken from the unions themselves.

Where the experimental developments are based upon sound principles and these principles are obvious, the difficulties in arranging matters through co-operation with the unions have not been insurmountable, and in some cases they have been wholly successful in changing the attitude of the unions toward that particular concern. Whenever experiments have been established in concerns and have failed or died out to some extent, an examination of the matter has brought to light almost invariably the existence of a system without any understanding of the fundamental principles upon which it must be based and, consequently, another failure to carry out the spirit of the experiment though machinery had been provided.

Unfortunately many manufacturers are still under the impression that human relations can be changed by the development of systems of operation, and where these systems have failed they have concluded that nothing could be done along these lines. Conclusions of this kind are not warranted and the examination of the failures will be entirely fruitless unless that examination takes in not only the system but the motives which were behind the introduction of the system and the ideas which governed its developments.

In fact, no valuation can be made of the work in any establishment, whether or not it has been successful, without a careful examination of its background and thorough understanding of the way in which these ideas have affected the development of the system and the possibilities of its outcome. This point is well illustrated by the experience of a large manufacturing establishment which introduced a conference system into four of its plants at the same time. After the system had been working about a year, a strike occurred in the industry and the records of the four plants stood about as follows:

Plant A—Nearly 100 per cent at work.
Plant B—About 60 per cent at work.
Plant C—About 60 per cent at work.
Plant D—Shut down.

Some time after the strike was over, I was talking with the head of this concern about the conditions brought to light by the strike. He said, of course, that the strike had made no difference in their pursuit of the plan, because they had not expected it to wipe out the difficulties or to avoid all rupture. He said, however, that the conditions which had been illustrated by the strike had shown fully the effect of the spirit of the management upon the value of the system. In the plant which had to be shut down, the management had been against the conference plan and they had used it to further their control and without the frankness and openness which was necessary to its consideration. Only in one plant had the management been entirely sold upon the conference plan idea and in this case the mill had continued with practically its full force. The net result was that the management of the plant which had been antagonistic to the new experiments was removed and certain changes were made in the management of the other two where the confidence had not been complete.

The heads of this concern recognized the fact that a system based upon sound principles will eventually create improvement, provided these principles are understood and the spirit of the principles permeates every development of the system. They did not condemn the system because it had failed to change immediately the human tradition and prejudices; their action was to change the supervision and management so that the system would have its full opportunity to develop along the sound lines upon which it was based.

This action should be contrasted with the action of a number of manufacturers who have introduced new experimental machinery for the improvement of industrial relations simply because of their difficulties with labor at the moment and, when these momentary difficulties have not been settled by their actions, they have discarded the new experiments and returned to their old practice convinced that they had made a mistake.

Undoubtedly the mistake was made, but it was made because of the attempt to introduce a new system of operation without any understanding of the human principles upon which it should be based. It would have been better for these concerns if they had not attempted these experiments, because the failure proved to their own workmen their incapacity to understand the human side and increased the suspicion which was already attached to their motives.

The Permanent Inter-Allied Automobile Bureau

THE general meeting of the Bureau of Inter-Allied Automobile Manufacturers' Associations was held at Antwerp recently. It was presided over by Baron Petiet, president of the French Automobile Manufacturers' Association, assisted by M. Cezanne, secretary. There were present at the meeting Messrs. Marchesi (Italy), Woolen and Woodfine (England), Count de Liedekerke, Galopin de Jonghe and Brassine (Belgium).

During the morning session, the International Union of Automobile Manufacturers' Association was finally liquidated, its place having been taken by the "Permanent Inter-Allied Bureau," the officials of which are as follows: M. Petiet, president; M. Marchesi, vice-pesident; M. Cezanne, secretary. A resolution was adopted urging the lowering of tariff duties on automobiles to a maximum of 15 per cent, with reciprocity.

During the afternoon session the constitution and by-laws were worked out. Each manufacturers' association admitted to the bureau will pay an annual membership fee. In addition the Bureau may call upon the member associations for an annual contribution on the basis of 25 centimes for each affiliated workman. Dates for national shows were allotted. The French show in October, the British in November, the Belgian in December and the American in January. However, the Paris show for 1920 has been abandoned.

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The Tool Designer's Hour

AT a time of unusual stress, a man or a class of men always steps to the front to solve the difficult problems which have arisen. In the critical period through which the manufacturing industries are now passing, the tool designer is that man. The manufacturer has realized that the price of labor will come down little, if any, in spite of a decline in the demand for his products. Living conditions and living costs to-day are such that it is impossible to reduce the wage to any extent. The only way in which the prices of products can be lowered is through increased production and through more economical production. More economical production will not be effected through any great drop in material costs or in labor cost; therefore, it is improvement in manufacturing methods which must be sought to solve the problem. A Detroit parts manufacturer recently said: "We are going to lick our manufacturing and financial problems in our tool room." In these words he expressed a keynote thought of the present time. We have thought our machines were very efficient and our manufacturing methods far in advance of anything else in the world, yet we must scan them critically and find if they are not even now becoming antiquated in the face of the new era which we are about to enter. We must have machines that will do everything but think. We must go to the manufacturers for special machines and tools to meet our needs and factories must have well equipped tool rooms with the highest developed tool designers and tool makers to protect needs of manufacturers, which will nullify the increased cost of labor.

It is not what a man makes per hour that determines the labor cost on an article but the cost of labor per unit of output. With better machinery and improved manufacturing methods, workmen will be able to earn much more and yet the labor cost on our manufactured articles will be reduced. It is to this end we must work, and manufacturers must be ever on the alert, scanning their methods to see if there are not places where they can improve, either in the handling of the parts as they proceed from the raw material to the finished product, or in the production machines themselves. There is not a factory which does not fall far short of the ultimate in this.

British Campaign Against Left Control

A DETERMINED attempt is being made in Great Britain to get the Government to take some action to prevent further cars with left-hand control from being put in service. The matter has reached a point where the Departmental Committee on Motorcars is considering compulsory regulations with regard to the use of driving signals on all left-hand-driven cars already in service. In explanation of this step, the chairman makes the statement that the committee is impressed by the rapid increase in the number of these vehicles and the danger to all road users caused by them, especially in congested and narrow thoroughfares.

The particular argument against left-driven vehicles is that the driver of such a vehicle cannot give an effective signal with his free arm when he wants to stop, turn out, etc., because the driver of the car behind, if the latter is of the (in England more common) right-hand-driven type, cannot see the signal, being seated on the opposite side.

In the United States there are immense numbers of both left-hand and right-hand-driven cars in use, and we have never even heard it suggested that this variation in the position of the driver was a source of danger. There are some indications that this campaign against left-hand-driven cars is backed by the British industry, which thus seeks to protect itself against onerous foreign competition. In Great Britain the rule of the road is to keep to the left and all cars are equipped with right-hand drive. In this country and in Continental Europe, where the rule of the road is to keep to the right, the left-hand drive has been constantly gaining in popularity and is, of course, the right construction if the right-hand drive is correct for England.

The reference to the rapid increase in the number of cars with left-hand drive on the roads, in the statement of the chairman of the Motorcar Regulations Committee, is no doubt directed chiefly at the Ford, which is now being turned out at Manchester in very considerable numbers, with the identical steering arrangement as in this country. From opinions expressed in the British automobile press, it seems likely that regulations adverse to left-hand steering will shortly be adopted. American manufacturers now catering to British trade or expecting to cultivate the British market in the future should be forewarned and should arrange to equip all chassis for export to Great Britain with right-hand control. This is, of course, contrary to the policy of an absolutely standardized product, but is a concession that will have to be made to the foreign purchaser.

All-Metal Airplanes

THE coming of real commercial aeronautics has given a tremendous impetus by the recent performance of the all metal internally trussed monoplanes now being demonstrated in this country. These planes, built upon a fundamental proposed in this country and to our government a number of years ago, for the first time approach cost and weight figures which make air commerce seem immediately feasible. In comparison, these streamlined ships of the air reveal the old biplanes as crude as prairie schooners.

The advantages of what airplanes could do have been known and recognized by industry for some time, but the cost of their operation has been prohibitive. The expense of operating some of our two Liberty engined bombers in military work has run as high as $100 per hour. It seems evident from the work already done by the new type of plane that one can carry freight and express in long distance work as cheaply as by motor truck, if not cheaper.

Always Remember Utility

WHERE the utility of the motor car and of automotive equipment generally is discussed, the Texas territory usually is cited as an excellent example. The long distances in that state, the lack of established connection between all points and the great business there, are the basis of this citation.

A few days ago a house paper from a Texas automotive sales concern was distributed. It was a very good number of such a paper and there was much in it that was constructive for sales work and much that sought to show the utility of the motor car. But on the title page was a sketch of a motor car that had carried to a beach a man and three girls. The girls would have been barred from an eastern beach on first sight. It was an attractive sketch, but we ask what the effect of this title page will be to a man who is inclined to doubt the utility of the motor car. The picture is not representative of the average use of the motor car in Texas, and in times like these we cannot see that the publisher is justified in the use of such a sketch. We are inclined to believe that the frontispiece will sufficiently censor the good arguments in the book so that the man to be reached will never see them.

Service and Finance

THE neglect of automobile service by manufacturers has recently taken an entirely new significance. Within the last few days, the writers of the daily paper financial comment and writers for the weekly papers featuring that sort of news have been explaining the "breaks" in motor stocks. In a number of cases, these explanations have turned on service. High price of gasoline is one explanation offered, but equal to this, in these columns, is the assertion that cars are poorly serviced. A writer in one widely read New York paper said: "The hopeless incompetence of the service stations has put all car owners in an ugly frame of mind."

The high price of gasoline is not within the power of the automotive industry to correct, but the manufacturer who is worried about the "break" in price of his stocks might well look over his service station. Long ago it was established that "the public be damned" was not a good policy, and many a good business has been ruined by an insistence on ignoring the public.

There is one little thing connected with the service stations in New York that has caused much profanity on the part of car owners, and it is not hard to find men who vow that they will buy "another kind of car next time" because of it. This is the inaccessible location of service stations. In Manhattan, the service stations are large, comparing well with many factories. It is necessary to locate them in factory districts, which is quite good business. But the trouble is that no stocks of even small parts are carried in parts of the city that can be reached with ease. The man whose car is out of commission, because of the breaking of some small part, goes to the salesroom by public conveyance to get this part. There he is told he must go to the service station. Likely this is in Long Island City, or on the banks of the Hudson, or the East River, or in some other little-known or inconvenient part of town. He may be told that "a bus runs over there pretty soon." But "pretty soon" is indefinite, as he finds if he waits. Perhaps he walks or takes a taxi, then he finds that the service station people are poorly equipped to wait on small trade. A half day is gone and he is angry.

The cost of keeping a few such parts in a handy location would have been small compared to the accumulated anger of the men who have had this experience. From the recent service managers' meetings we have read of service stations that function 100 per cent. By talking to car owners, we hear of many service stations that do not function at all, except below the zero line in anything but producing indignation and distrust.

Perhaps if the financial manager of some of the manufacturers would investigate service conditions he could find something to talk about in the next confidential meeting.

Depression Haunts Markets Abroad

Failure of Demand Closing Factories

Expected Price Reductions Keep Off Buyers—Tax Hurts Italy —Gasoline High

(*By Cable to* AUTOMOTIVE INDUSTRIES)

PARIS, Aug. 9.—Discouraging depression continues in the French, British and Italian automobile markets. The demand for trucks is dead in all three countries, while potential passenger car purchasers are holding off from buying in the belief that car prices will decline. There is no likelihood of such a contingency in this country at present, however, although announcement has been made in England of a cut amounting to 50 pounds. While there is scant likelihood of lower prices for new cars, speculators who bought up used cars for re-sale have been badly bitten because of the declining market.

Marius Berliet, who owns one of the largest automobile factories in France, is reported to be in serious financial difficulties. He recently issued 50,000 6 per cent bonds at $100 each. Since April Berliet has laid off 6000 of his 15,000 workmen and many others are likely to be dismissed.

Berliet's truck production since April has been from 400 to 450 a month and the sales have averaged only about 200 a month. The consequence is that there is now on hand a stock of 1700 trucks.

The new low-priced car which was to be made in a huge new factory which Berliet has virtually completed at Venissieux near Lyons is not yet in production. Work has been begun, however, in many of the shops.

The plant covers 2,400,000 sq. yd. and has been built along American lines for progressive assembly. One reason for the delay in production is that thousands of ball bearings had to be scrapped as defective.

This car, which was to sell at $5,000, normal exchange, is a close copy of the American Dodge and it is reported here that Dodge Brothers of Detroit has been awarded heavy damages in a suit instituted against Berliet.

Berliet entered the automobile business in a suburb of Lyons in 1899 with three workmen and a capital of $900. When the war began his factory covered 800,000 sq. ft., he employed 2000 men and turned out 3000 vehicles a year.

The Italian automobile industry is seriously alarmed at the new horsepower taxes, just voted, to go into effect next January. These taxes are so high that the smallest car produced in Italy will pay $250 a year tax. The impost on the 4-cylinder, 37-hp. Lancia will be $1,130 annually and that on the new 12-cylinder Lanica, to be produced in January, will be $3,000 a year. These taxes were imposed to gratify the Socialists, who have been demanding that luxuries bear a greater part of the nation's financial burden.

President Agnelli of the Fiat company informed the Socialists that unless the Government modifies the decree 15,000 workmen will be dismissed from the Turin factories within a year. This prospect has so alarmed the radicals that they are willing to join in an agitation for the repeal of the tax which will virtually kill the automobile business of the country if it is put into effect.

Gasoline $2.28 in France

Another factor which has lessened the demand for passenger cars in France is the steadily rising price of gasoline. Another advance, just announced, makes the price $2.28 an American gallon.

Robert Esnault Pelterie has brought suit against French airplane manufacturers for infringement on his patent for elevator and aileron control. He claims a total indemnity of $13,000,000 representing $400 on each plane built during the war. The division of the claims would be:

Spad, $4,000,000; Nieuport, $3,500,000; Breguet, $3,500,000; Caudron, $500,000; Morane, $1,000,000; Farman, $200,000.

The courts have upheld the Pelterie patents but the manufacturers have refused to pay and the plaintiff has appealed to the Supreme Court to seize funds held by the state on behalf of these firms. The manufacturers assert they will close their factories if the court orders payment to Pelterie out of these funds for the money already is mortgaged and an adverse decision would cause the ruin of the entire aviation industry.

A private company representing all the leading airplane makers has been formed to dispose of surplus French army aviation material. The capital of the company is $600,000. The Government would take 60 per cent of the profits. It will require three months to prepare inventories of the aviation material and probably three years to dispose of the stocks. BRADLEY.

French Exports Grow, Imports Decrease

Car Shipments in Six Months of 1920 Were $33,148,400—Trucks $26,760,200

PARIS, Aug. 1 (*Special Correspondence*)—French automotive exports for the first six months of the present year show an enormous increase, compared with the corresponding figure of last year, according to official returns.

The total exports under the heading automotive industries, which also include the bicycle industry, is $89,427,000 from Jan. 1 to June 30, 1920. The most important single items under this total are $33,148,400 for passenger cars, $26,760,200 for trucks, and $25,560,000 for automobile tires.

During the same period automotive imports have decreased from $41,357,400 to $30,700,600. Truck importations in particular have been cut, for in 1919 they stood at $23,363,600, whereas for the first six months of the present year they stand at $16,111,800. The following are the detail figures:

FRENCH AUTOMOTIVE EXPORTS

	6 Months 1919	6 Months 1920
Automobiles ...	$852,400	$33,148,400
Trucks	630,400	26,760,200
Motorcycles	14,800	240,400
Bicycles and tires	424,000	1,119,600
Airplanes	1,083,000	2,057,000
Flying boats....	92,800	136,600
Automobile tires	12,345,000	25,560,000
Motor boats....	1,200	304,800
Balloons	114,200	.....
Rigid airships..	.....	100,000
	$15,557,800	$89,427,000

FRENCH AUTOMOTIVE IMPORTS

	6 Months 1919	6 Months 1920
Automobiles and tires....	$740,800	$548,600
Trucks	23,363,600	16,111,800
Motorcycles ...	554,200	144,200
Bicycles and tires	608,000	1,469,000
Airplanes	339,000	3,000
Flying boats...	50,800	.....
Automobile tires	15,695,600	12,356,200
Motor boats....	5,400	67,800
	$41,357,400	$30,700,600

TO MAKE NEW GEAR SYSTEM

SISTERSVILLE, W. VA., Aug. 9—A $2,500,000 corporation is being organized to manufacture a transmission and gear system invented and patented by Benjamin F. Webb, vice-president of the Sistersville Acetylene Welding Co., and Andrew J. Karl, both of this city.

Banks Mobilize Credits for Crops

Direct All Efforts to Moving Harvest

General Tightening of Resources Seen for Month or More—Railroads Active

NEW YORK, Aug. 9—The inevitable tightening of credit in the great agricultural districts, in preparation for the peak of the crop-moving season, has arrived. This is true particularly in the Minneapolis, Kansas City and Dallas districts. In the Minneapolis district orders have gone out to member banks to call loans on all paper which can be classed as speculative. In the Kansas City district also every possible effort is being made to get funds in hand for crop handling.

Reserve banks in the chief agricultural sections will have to call on other districts to help them handle the crop movement and the result will be a general tightening for another month at least. In ordinary years the situation would be only temporary, but it is complicated now by the fact that transportation difficulties make prompt crop movement impossible and that a considerable part of last year's crop remains in warehouses. This will result in "freezing" an enormous amount of credit which usually would be liquidated within 30 or 60 days after the harvests.

The railroads have reduced to less than 100,000 the accumulation of loaded cars, but there has been no material improvement in the situation except in widely scattered districts. Box cars are still flowing into the crop belts and open-top cars to the mines. Notwithstanding the efforts made no great progress has been reported in accumulating reserve stocks of coal for winter.

Severe Strain Seen in Dallas District

DALLAS, Aug. 9—The credit situation in the Dallas district is intrinsically sound, but many elements have combined to place a severe strain on credit. Inability to dispose of low-grade cotton and the virtual freight embargo in many sections has slowed up liquidation. The unusual cost of planting the present crop, because of the high price of labor and the necessity for replanting in many places, has added to the credit burden. The fact that there has been no real market for wool and mohair has, to some extent, embarrassed banks in western Texas and in New Mexico.

This situation is offset, however, by the fact that in the district, ready for shipment, are cotton, wool, mohair, wheat, cottonseed products and cattle, with a certain value of $250,000,000. These will gradually be marketed and the railroad car supply is slowly improving.

For months there has been a steady elimination of all speculative loans and credit has been limited to production uses. The loans of the Federal Reserve bank are heavy and are expected to increase for the next 30 days at least. It is rediscounting in substantial amounts with other Federal Reserve banks, but not so heavily as last year.

Kansas City Banks May Need $20,000,000

KANSAS CITY, Aug. 9—Estimates indicate that the Kansas City Federal Reserve Bank may find it necessary to borrow as much as $20,000,000 more from the other central banks before the peak of the crop moving demands is reached. This is $10,000,000 less than was believed probable a few weeks ago, however. It already has borrowed $19,000,000. To conserve credit for crop-moving needs, the Kansas City bank still refuses to rediscount passenger automobile and other "luxury" paper. It is rediscounting motor truck and tractor paper, however.

The bank's estimates may be thrown entirely out of adjustment by the railroad situation. If the carriers supply enough cars the prospect for prompt liquidation will be much better than if the supply proves short. The outlook now is not encouraging and more cars are needed than are being received. Lack of cars also is hindering shipments of cattle and liquidation of cattle loans.

Willys Corporations Cut Working Forces

TOLEDO, Aug. 9—The Willys-Overland plant has reduced its working force by two thousand within the past few weeks, owing to chaotic shipping conditions. The big difficulty is in getting body materials and plate and bar steel.

In the force of the Electric Auto-Lite corporation plant, a cut of about 10 per cent has been made on account of reduction in demand. This, however, will be offset by the increased production in the Willys-Light Division.

OHIO ROAD PROGRAM APPROVED

COLUMBUS, Aug. 9.—Practically all Federal aid road projects in Ohio have been approved by the Federal Department of Public Roads, following a conference between W. A. Alsdorf, secretary of the Ohio Good Roads Federation, with officials at Washington. Ohio Highway Commissioner Taylor was also at the conference.

Minneapolis Recalls Speculative Loans

District Banks Notified to Ensure Ability to Meet Harvesting Demands

MINNEAPOLIS, Aug. 9.—The Federal Reserve Bank has sent out a letter indicating to banks that their chief business now must be to see to the handling of the present old grain stocks and new crop. The design is to cut out all speculative paper which must be called in for liquidation. While there is no idea of hitting at the automobile trade the bank believes a lot of people are buying automobiles on notes and that this must be done away with also until crop is handled.

Much of this paper for payment of cars is made by well to do farmers who have no money at hand, but will have when crop is sold. To the extent that it cuts off this sort of business it will slow down the motor car appreciably in this section. However, it is believed when the country banks begin to get in returns on crops and the farmer again has money he will be able to act independently of the Reserve Bank restrictions.

A letter sent by the Reserve Bank to its members says:

"At this time it appears highly desirable that the Federal Reserve Bank should make provision for the future by the reduction of the volume of credit extended to its members, and thereby ensure its ability to meet the demands that will result from the planting and harvesting seasons of the coming year.

"We propose establishing accurate records of the shipment of agricultural and live stock products from each section of this district to the markets. When those products have moved, *we shall insist upon liquidation from every member bank in this district that has had occasion to use our rediscount facilities, and it* will only be under unusual circumstances that member banks will be warranted in making applications for rediscount during the period between crop moving and spring planting. This should not inflict a hardship upon necessary business, agriculture or industry, as we feel that with good crops, the resources of our member banks will be sufficient."

ELGIN PRICES ADVANCE

CHICAGO, Aug. 9—On July 29 the price of the Elgin Six was increased $110 on each model. The new prices are as follows: Touring, $1,775; Scout, $1,895; Sedan, $2,685.

Atlanta Bank Issues Call for Discretion

Favors Loans for Trucks, Truck Lines and Tractors—Luxuries Opposed

NEW ORLEANS, Aug. 10—Apparently bankers who are members of the Federal Reserve Bank, and especially those in the Southern district, of which Atlanta is the center, are to be left to their own discretion in the matter of making loans for the purchase of automobiles, if a letter recently made public in New Orleans, from M. B. Wellborn, governor of this district of the Federal Reserve Board, is to be taken as putting an end to the problem.

The latest communication from the Federal Reserve district governor indicates that he is in favor of loans for the advancement of truck sales, and to enable the installation of motor truck transport lines in all parts of his district. He also favors aid to tractor selling, but insists that credits for financing the "purchase of pleasure automobiles," be restricted.

Wellborn's letter in part follows:

"The credit situation at this time is such that I feel we have reached a point where it is imperative that we should have an intelligent and discriminating policy of control over credits, especially those extended for pleasures and luxuries, and for that reason we are restricting credits for financing the purchases of pleasure automobiles.

"I think that, at this time, when transportation facilities are so badly crippled, we are doing a useful public service in continuing to grant credits for financing trucks and tractors. At present the credit situation is closely interwoven with transportation; commerce being tied up due to lack of transportation of necessary goods. The false policy of the public for years past in regard to the common carrier injured them to the extent that their credit has been greatly impaired and the public is now suffering as the result of their treatment of the railroads.

"I feel that anything that can be done to encourage production and the sale of motor trucks will be of real value to the transportation problem, and, in view of the shortage of farm labor and the necessity for increased production of foodstuffs, I think the entire country will benefit from the manufacture and sale of tractors."

This letter was sent to David Thomas, general manager of the Motor Truck Manufacturers' Association.

GEORGIA TO ACT ON LOANS

ATLANTA, Aug. 10—A resolution declaring that the action of the Federal Reserve Bank in the curtailing of credit on automobiles will prove detrimental to all classes of industry, especially to the farmers, has been introduced before the Georgia State Legislature. If adopted by the assembly it will be forwarded to authorities of the Federal Reserve Bank, with the request of the Georgia legislative body that the bank modify its restrictions. Senator Shingler, author of the bill, heartily commended the newspapers of the South that have taken an editorial stand against the Federal Reserve Bank's policy in the restriction of automobile credit.

G. M. C. Acceptance Shows Business Gain

NEW YORK, Aug. 9—The balance sheet of the General Motors Acceptance Corp. for the six months ended June 30 compares with that for the six months ended Dec. 31, 1919, as follows:

Assets.	June 30, 1920	Dec. 31, 1919
Cash	$1,580,270	$505,323
Liberty bonds	.....	470,000
Bills receivable	33,087,337	12,714,793
Foreign bills of exch. drawn	5,199,747	2,310,848
Accounts receivable.	336,849	89,711
Interest earned not recorded	36,313	15,049
Furniture and equipment	229,004	117,400
Investments	6,075	6,075
*Cash and securities pledged	213,623	198,548
Deferred charges	242,192	112,676
Total	$40,931,410	$16,540,423
Liabilities—		
Capital stock	$3,200,000	$2,000,000
Surplus	1,034,119	500,884
Bills payable	30,136,549	11,258,029
Foreign bills of exch. discounted	5,199,747	2,310,848
Accounts payable	201,842	25,895
*Cash and securities pledged	213,623	198,548
Interest received in advance	517,996	106,878
Accrued taxes	21,000	10,000
Reserves	406,534	129,341
Total	$40,931,410	$16,540,423

*Foreign customers.

Philadelphia Forms Acceptance Corporation

PHILADELPHIA, Aug. 7—J. P. Cranston, general manager of the Vim Motor Truck Co.'s Philadelphia branch, has resigned to become president of the Acceptance and Finance Corp., which has been organized by Philadelphia business men with a capital of $2,000,000. The company's main offices are in this city. It will specialize on the purchase of secured paper covering time purchases of motor trucks and will conduct a general brokerage business. Cranston is president of the Motor Truck Association of Philadelphia and a director and treasurer of the Bateman Mfg. Co.

FINANCE CORPORATION SUED

NEW YORK, Aug. 10—Ormsby McHarg, secretary and treasurer of the Commonwealth Finance Corp., formed to finance the sale of automobiles, has filed suit in the Supreme Court against three other directors and officers whom he charges with entering into other ventures for personal gain while the company lost $250,000. McHarg also is suing the other stockholders to compel the defendants to pay into the company any money lost through the alleged personal operations.

Cleveland Curtails Only on Speculation

Automobile Paper Honored Where Legitimacy Is Shown—Bars Carrying Propositions

CLEVELAND, Aug. 9—The Federal Reserve Bank of the Cleveland district has not taken any action toward retarding legitimate business by curtailing credits, according to a statement made at the bank to a representative of AUTOMOTIVE INDUSTRIES. The bank has urged, however, that in allowing credit, member banks give consideration to the essential or non-essential character of the purpose for which borrowed funds are used. The Federal bank here has never ruled that the automobile industry, passenger car or motor truck division, is non-essential. No distinction has been drawn between commercial paper for passenger car and for motor truck.

In fact the bank has not discriminated against paper of any industry. It has discouraged speculation of all kinds, however, even in real estate and building, of which there has been a considerable amount. The bank's statement follows:

"We have consistently urged that our banks should give due consideration to the essential or non-essential character of the purposes for which borrowed funds are used, and speculation of all kinds, even real estate and building, of which there has been a considerable amount, has been discouraged. However, the banks in the various communities are the best judges as to whether or not borrowed funds are being used for essential or non-essential purposes, and this is purely a matter which they themselves must decide. We have not discriminated against any class of paper.

"I might add, however, that the proceeds of paper which we rediscount must have been used for current commercial, industrial, agricultural or live stock operations, and not to finance general carrying propositions. This is recognized in the Federal Reserve Act by the fact that maturity of paper taken in commercial transactions that we may rediscount for a member bank is ninety days and of that taken in agricultural or live stock transactions, six months."

JACKSON FORMS NEW COMPANY

MANITOWOC, WIS., Aug. 10—The Jacquet Motor Corp., Manitowoc, has been incorporated with a capital of $100,000 to manufacture passenger and commercial cars and tractors. The organizer of the company is Alfred J. Jackson, formerly president of the Jacquet Motors Corp. of Belding, Mich. The Manitowoc Association of Commerce announces that Jackson has agreed to move the Belding plant to this city. The original Jacquet Motors assert that Jackson now has no connection with the company and that he was ousted by the Board of Directors.

Receiver Petition Opposed by Moore

Company Declares Court Without Jurisdiction — Stockholders Complain of Methods

DANVILLE, ILL., Aug. 9—Attorneys for the Moore Motor Vehicle Co. have filed a petition demanding that the proceedings asking for a receiver for the corporation be dismissed on the ground that the Federal court is without jurisdiction. It is contended that inasmuch as the Moore Motor Vehicle Co. of South Dakota, of which the Illinois corporation is a component part, is nonresident, it cannot be sued by residents of Indiana, who instituted the suit.

The company claims that in the three years it has been in operation it has made 1112 automobiles. Plant employees numbered 120, while those in the offices and salesroom, including those who sold stock, numbered 50 more.

Complaining stockholders declare aggregate sales of stock were $2,190,530, while the figures of the company show an average loss on each car produced of approximately $200. The Illinois company was capitalized at only $100,000, but the South Dakota corporation, which handled and sold the stock, was capitalized at $5,000,000. It is alleged that the good will and good name of the Illinois company were sold for $10,000.

Another assertion is that the proceeds from stock sales were credited to the South Dakota company while purchases of supplies and sales of cars were made in the name of the Illinois company.

The Marwin Motor Truck Co. of Kenosha, Wis., has informed James H. Elliott, temporary receiver for the Moore Motor Vehicle Co., that its offer to purchase the Danville plant, assume the liabilities and give the stockholders $150,000 in preferred stock of the Kenosha concern has been withdrawn. The cancellation of the Marwin proposal has been received with chagrin by stockholders of the Moore company who believed it offered a solution of the financial difficulties of their corporation.

Value of Assets Low

Walter V. Dysert, attorney for the receiver, is authority for the statement that a partial aggregation of the company's conditions and an investigation into the assets reveal that stockholders will not receive more than 10 cents on the dollar. There is considerable material on the sidetrack of the plant on which the freight has not been paid and the demurrage charges are piling up daily.

The receiver and his assistants are tracing automobiles recently assembled and shipped to different parts of the country. It has been learned that 12 cars recently were consigned to Los Angeles and that another carload is being held in Omaha.

Dysert intimates legal proceedings will be started in an attempt to have the courts cancel all the common stock of the company, much of which is held by George Moore, former president, and other officers. This would leave whatever assets may be available after the payment of creditors for distribution among the preferred stockholders.

Standard Prices Rise, Pleads for Economy

NEW ORLEANS, Aug. 9.—Coincident with an increase in gasoline prices to 29 cents a gallon, the Standard Oil Co. has launched a campaign through the daily press in which it pleads for economy by automobile owners. It quotes figures showing the increase in demand in the past two years and lays the increased cost to excessive usage. The company's statement is combated by the Louisiana-Mississippi Automotive Trades' Association, which quotes figures compiled by the National Automobile Chamber of Commerce which belie the contention of diminishing supply. These figures were recently shown in AUTOMOTIVE INDUSTRIES.

Concluding its reply to the Standard Oil statement, the trades' association says:

"There is no reason in the world for the increase in price except that the Standard Oil Co. sees the opportunity to mulct another cent per gallon from the owners and operators of automotive vehicles and power boats."

In another part of its reply the association blames the monopoly of Standard Oil on oil production in the South as an outstanding reason for the advance.

Jones Creditors Ask for Receivership

KANSAS CITY, Aug. 9—Difficulties encountered in disposing of motor credit paper to banks for rediscount brought the Jones Motor Co. of Wichita, manufacturer of the Jones Six, under an application for receivership before Circuit Judge Stone in the Federal Court here. Creditors of the firm presented the petition. Attorneys and officials of the company declared that the firm was solvent and were willing to agree to an appointment of a receiver to operate the business during the present money shortage. Creditors when shown a statement of the company's assets agreed that the bankruptcy proceedings should not be advisable. The case was taken under advisement and the court's decision will be announced later.

FUEL RISES IN PITTSBURGH

PITTSBURGH, Aug. 9.—The Atlantic Refining Co. has advanced the price of gasoline one cent to 34 cents a gallon. Higher grade gasoline (68-70 degree) is quoted at 37 cents.

N. A. C. C. Shows Line for Fuel Research

Urges Bureau of Standards to Widen Study So As to Correct Situation

NEW YORK, Aug. 7.—Need for further investigation into the field of motor vehicle fuels is urged upon the Bureau of Standards by the National Automobile Chamber of Commerce in an appeal made this week. Five points are outlined by the chamber as the most important lines along which the investigation should be directed. In submitting the appeal the chamber announces its willingness to place before the bureau all information it has upon the points indicated and its desire to co-operate in any way deemed fitting.

Its suggestions for investigation are:

"(a) Securing of greater economy in the use of present commercial gasoline in present equipment without appreciable sacrifice of power; acceleration and general performance.

"(b) Investigation into the possibility of a wider use of blended and substitute fuels which will make commercially available in increasing amounts other fuels such as benzol, alcohol, etc., possibly of less volatile petroleum products to some extent, thus increasing the total available fuel.

"(c) An educational campaign, coupled with any practicable restrictive measures to check the growing adoption of fuel oil as fuel where coal can be used.

"(d) The ultimate development of more economical transportation through a study of the mechanics of vehicles, elimination of excessive mechanical losses, possible reduction in weight, and a training of users, particularly users of business vehicles, to accept a less exacting standard of performance.

"(e) The ultimate development of power plants having higher thermal efficiency and less exacting demands as to quality of fuel.

"As special problems under this general head might be included: Automobile and Truck Performance, Carbureter Design, Combustion of Hydrocarbon Fuels at High Pressure, Solid and Pneumatic Tires, Manifolds, Fuel Savers, Fuel Improvers, etc. A study of lubricating oils, greases, etc., would also be a value."

Rationing Not Needed

NEW YORK, Aug. 10.—Need for rationing in territory east of the Rockies is discounted by R. L. Welch, secretary of the American Petroleum Institute in a letter to the National Chamber of Commerce to-day. He said, however, that "reckless and wasteful use" should be condemned and would bring serious consequences in some sections of the country if continued. Increases in production over demand as in June, he said, were only temporary.

Goodrich Guarantees Prices to November

Present High Costs Disprove Rumors of Prospective Drop, Company Asserts

AKRON, Aug. 9—The tire trade has been advised by the B. F. Goodrich Co. that present prices of all sizes and classes of Goodrich tires are guaranteed until Nov. 1. The fixing of Nov. 1 is said to have no significance except that it marks the end of the dealers' contract selling season. A letter sent out by the company says:

"Public sentiment is considerably affected by rumors of approaching declines in commodity prices, so much so in fact that we feel it advisable to make a plain statement of facts regarding this situation so far as Goodrich tires are concerned.

"Due to present high costs of fabric, labor and other elements entering into tire production costs, with no evidence of any lowering of these costs, there can be no possible justification for the reports current in some quarters of a decline in tire prices.

"In the event of any unforeseen condition arising which would enable us to make a general reduction in our present schedules prior to Nov. 1, we will stand back of our guarantee by protecting Goodrich dealers on all stocks on hand unsold at the time of such reduction, which were purchased between the present date and Nov. 1."

New Bollstrom Truck Ready for Market

ST. LOUIS, MICH., Aug. 9—A new make of four wheel drive truck, the Bollstrom, has made its appearance in this town, as the product of Bollstrom Motors, Inc. It is a high powered, high speed truck with 144-in. wheel base and a total length of 240 in. The loading platform measures 168 x 72 in.

The fore and aft propeller shafts extend from the transfer case to the front and rear axle. This arrangement results in comparatively short propeller shafts with angularities well within the capacity of the universal joints. The final drive is through bevel gears to the differential and internal gear axles.

The motor is a 4½ x 5½ Hinkley and the power is transmitted by a 9-plate dry clutch through a short straight line universal shaft to a Cotta four-speed transmission. The transmission and transfer case are mounted closely together on the sub-frame and connected by a flexible joint. The power transmission through the transfer case to the fore and aft shafts is by two silent chains of ¾-in. pitch by 4½-in. width, and the whole arrangement is such that the fore and aft shafts are on the center line of the car.

The transfer case is fitted with two driving chains, either of which may be put in operation through a positive clutch on the driven shaft. The chain ratios in relation to the transmission gear are such as to provide eight different forward speeds with a total driving reduction varying from 68 to 1 on the low to 5.76 to 1 on the high gear. Clark internal drive axles are used.

The load is almost equally divided between the four driving wheels, because the motor is on a three-point suspension placed well forward of the front axle, making it possible to use a normal wheel base and short turning radius. Load distribution is about 55-45 and the road clearance is 14 inches.

Dual-Valved Engine Now on Pierce Truck

BUFFALO, Aug. 7—One of the most important of the year's developments in motor truck engineering is the employment of dual-valved engines with double ignition and electric lights in a new line of Pierce-Arrow trucks which includes a 3½-ton model and a tractor unit in addition to the 2-ton and 5-ton Pierce-Arrow worm-driven models which have been offered practically without change since 1910.

The dual-valved engine now fitted on all Pierce-Arrow trucks is an adaptation of the type employed for several years past in the Pierce-Arrow passenger car. It is the claim of the Pierce-Arrow company that the dual-valved engines provide a greatly increased pulling power with an increase in economy expressed in a greater mileage per gallon of gasoline. The addition of the 3½-ton truck and the tractor gives a complete line.

Akron Sees Prosperity in New Freight Rates

AKRON, Aug. 9—The coming advance in the freight and passenger rates on the railroads is regarded in Akron as a good omen for the automotive industries. It is contended that the motor truck will be in greater demand than ever before for short haul consignments, and the passenger car will be used by commercial houses to a greater extent than ever before for the use of traveling representatives, all this being reflected in an increased demand for the product of the tire factories. Again, there is optimism in the theory that the railroads, with increased revenues, will be in better condition, and with the railroads in a prosperous state the entire country feels the benefit.

McINTYRE BUILDS ENGINE

KALAMAZOO, MICH., Aug. 9—The McIntyre Motor Sales Co., successors to the McIntyre Motor Co., are entering the engine manufacturing field with two four-cylinder power plants of 4½ by 6 and 3¾ by 5½ in. size respectively. The valves are of piston type operating in a sleeve inserted into the cylinder wall. The valves are driven by connecting rods from an eccentric shaft operated by a chain drive from the main crankshaft.

A. A. A. Tests Pistons on Cole Stock Cars

Officials Put Cars Through Trials to Ascertain Interchangeability of Equipment

INDIANAPOLIS, Aug. 9.—A series of tests under A. A. A. sanction were made at the Indianapolis motor speedway on three stock Cole Aero-Eights on July 29 and 30. The object of the tests was to prove that the Cole aluminum piston is interchangeable.

Test runs were first made to check the speedometers.

Then a series of six acceleration tests were made with each car, three each way of the track, to eliminate the effects of the wind. At the completion of these tests the cars were locked up.

The following morning the three cars were driven back to the speedway, where two mechanics on each car proceeded to remove the pistons and connecting rods from each engine. An arbitrary chart was made showing where each piston should go, so arranged that four pistons from each of two cars should be put into the engine of the third.

In the afternoon the reassembled cars were again given acceleration tests. The same driver drove in all tests, so as to remove the personal equation. At the finish of each series of acceleration tests on the second day a flying start mile, with wide open throttle, was clocked. The results of both acceleration tests are given in the accompanying tables. The maximum variation was only 5 per cent.

WEIGHTS OF CARS

Car No.	Car complete with tanks full but without spare tire	Passengers, Weight	Total Weight
1	3780	650	4430
2	3798	638	4436
3	3792	690	4482

ACCELERATION TESTS

Car No.	Speedometer Reading	Test July 29 with original pistons	Test July 30 with pistons taken from other two cars
1	10-20	5.7 seconds	5.8 seconds
	10-30	10.7	11.2
	10-40	17.6	17.7
	10-50	26.06	25.80
2	10-20	6.0	6.0
	10-30	11.4	11.6
	10-40	17.5	18.2
	10-50	25.60	26.53
3	10-20	5.4	5.7
	10-30	10 8	10.8
	10-40	17.5	17.8
	10-50	26.36	27.28

MAXIMUM SPEED TEST

Car No.	Time	Average M.P.H.
1	29.6 seconds	60.8
2	29.0	62.0
3	29.0	62.0
Average		61.6

PISTON CLEARANCE MEASUREMENTS

Car No.	Average Clearance
1	.0017 inch
2	.003
3	.002
Average	.0022
Minimum clearance	.001
Maximum clearance	.00575

Gray Motors Plans Knocked Down Car

Will Facilitate Shipping and Lower Freight Costs—Assembly by Subsidiaries

DETROIT, Aug. 9—The Gray Motors Corp., which recently bought out the Gray Motor Co. of this city, will continue the manufacture of the Gray truck and tractor engine, and in addition will manufacture a four-cylinder car. The company, which is headed by Frank F. Beall, formerly vice-president of manufacturing of the Packard Motor Car Co., will introduce some novel methods in the shipment of its cars.

Cars will be delivered in knocked-down condition to subsidiary assembly companies scattered throughout the distributing district. The subsidiary concerns will be partially owned and financed by the Gray Motors Corp., but will be independently operated. By this plan it is expected that ten cars can be shipped in the ordinary freight car, instead of the customary three. To suit this purpose, the car is being designed particularly with the knocked-down shipment in mind, the body, for instance, being a special design which, it is stated, can be put together in less than 1 hr.

The car is being designed by Benjamin Briscoe and Stahl, well-known consulting engineers in Detroit, and is a further development of a French design recently completed by Benjamin Briscoe.

A test car is now on the road and it is expected to be in production some time within the next five or six months. The car incorporates an improved design of the Gray motor with enclosed valves, pressure feed lubrication, longer connecting rods, lighter pistons and in general an advanced design as compared with the present Gray engine. The block-cast four cylinders are 3½ by 5-in. The other parts of the chassis are composed of the products of prominent parts manufacturers, including the Borg & Beck clutch, Thermoid Hardy universal, Munsey transmission and axles which are the manufacturers' own design. The wheelbase is 112 in.

The price of the car has not as yet been fixed, but it will probably be well under $2,000. It is intended to make a strong bid for export business with this product and it is anticipated that the knocked-down feature of the car will greatly assist in efficient crating and consequent saving on freight rates.

KANSAS CITY MECHANICS STRIKE

KANSAS CITY, Aug. 9.—Two hundred union mechanics employed by Kansas City dealers and garage men are on strike for shorter hours and higher wages. A comparatively small number of non-union mechanics also are out, but the remainder of the 1500 motor car machinists employed in this city are at work.

The demands of the union include a 44-hour week, including a Saturday half-holiday, double pay for overtime and for work on holidays. The present rate of pay ranges up to 65 cents an hour, and under the working agreement which has been presented to employers the maximum would be 95 cents. The minimum would be 60 cents for men with less than one year's experience, 70 cents for men with less than two years' experience, 80 cents for men with less than three, and 95 cents for the others.

Black & Decker Sees Business Increase

NEW YORK, Aug. 9—Indications of a bettering of business conditions are found in certain of the advertising records of the Black & Decker Co., of Baltimore, as compiled by advertising manager G. W. Brogan. The curve of inquiries from the company's advertising, he states, generally corresponds with the sales curve, but runs a month ahead of it. In other words, if the inquiries rise or fall in June the business will travel similarly during July.

A study of the curves of the last few months shows a fall in business during June, which was preceded by a drop in inquiries during May. During July the inquiries rose somewhat and the rise was followed by an upward trend in sales during the first part of August. The inquiry curve for August is again going upward, indicating, Brogan states, the probability of a further increase in business in September.

The company has been using emergency measures to keep its plant up with the demand, which is now better than half of normal. To secure small electric motors for its line of electric drills and air compressors it has been running a pneumatic-tired 2-ton truck and a solid-tired 5-ton truck between Fort Wayne, Ind., and Baltimore, carrying drills and compressors westward and motors eastward. On the last few trips the expense, including depreciation and all other items, was brought down as low as the express rate. With the increase in railway rates the trucks will be able to beat the railroad cost, Brogan states.

GASOLINE SHORTAGE IN ITALY

WASHINGTON, Aug. 7.—Only 20,000 automobiles are operated for private purposes in Italy, according to a dispatch from Alfred Dennis, American commercial attaché at Rome. The scarcity and shortage of gasoline is largely responsible for this limited use.

Italian automobile dealers have been hard hit by the ration system adopted by the Italian Government. An investigation just completed showed that 14,800 metric tons (2204.6 lb. each) is required to operate the 20,000 privately-owned cars. The assignments are made under the direction of the State Mineral Monopoly. The total quantity of gasoline imported into Italy for all purposes is estimated at 144,000 to 180,000 metric tons. The privately-owned cars consume one-tenth of the supply.

New Orleans Trucks Attack Freight Jam

Owners Merge Interests in Concerted Move to Relieve Shipping Congestion

NEW ORLEANS, Aug. 9—The truck tonnage of New Orleans is being assembled and co-ordinated with a view to relieving the local freight jam and the over-congested condition of freight warehouses, both rail and waterfront, here. A plan developed by H. N. Siegel and Walter Betz of the Frank Weinberger Automotive Parts Co. is being put in operation to clear up the depressed commercial condition resulting from the partial tie-up of freight which should be moved immediately.

The first potential unit is organized, consisting of 150 trucks manned with drivers and helpers. The draymen are to receive regular compensation from the merchants whose freight they move at the regular rate, the Weinberger company acting as a voluntary clearing-house to bring the truck owners and the merchants together and receive the money from the merchants and pay it to the truck owners. Railroad officials have agreed to help in every way possible, to notify merchants promptly of shipments and to aid the trucks in getting to stored goods or to loaded freight cars or warehouses, immediately. Water shipping agencies have agreed to help in the same manner. The second unit, also of 150 trucks, is about half completed.

The Association of Commerce, the Joint Traffic Bureau, the Board of Trade and other civic and commercial organizations have joined with the Weinberger company to complete the organization of the draymen and their trucks into units which, centrally directed, can move the congested freight much more rapidly and more effectively than the separate draymen each working for himself. The merchants of the city are overjoyed at the work already accomplished by the first unit. The Association of Commerce called a meeting of draymen, merchants, railroad officials and others interested, at which the plan was fully explained and arrangements made for the signing up of all the truck operators of the city.

The plan, if it is successful, as it seems likely to be, is to be extensively advertised throughout the country, and firms in other cities given full information as to how to handle such an organization.

INVENTS HEADLIGHT DIRECTOR

ATLANTA, Aug. 9.—An automatic director of automobile headlights controlled through the steering apparatus has been invented and patented by R. H. Shivers of Atlanta. The new device is called the "Stero-lite," and the light is directed along the highway as the wheels of the car are turned.

Publicity Defeats Truck Makers' Strike

Cincinnati Factories Win in Appeal to Public—Production Returns Improve

CINCINNATI, Aug. 9—After being handicapped for several months by the machinists' strike, truck manufacturers are beginning to settle down to normal conditions and are getting their plants working smoothly on the non-union basis. The United States Motor Truck Co., which had a very hard fight and which was one of the first to resort to the injunction, has just revealed one of the methods it used in fighting the strike and enlisting public sentiment.

At a meeting of the Northern Kentucky Employers' Association, H. H. Southgate of the truck company urged the use of page advertisements in the daily papers with a follow-up campaign by mail. These advertisements were then reproduced in a four-page folder and mailed to over twenty thousand people. Every wife of a machinist was on the list and this is said to have been one of the best cards played, for the wives of the strikers were made acquainted with the real facts in the case.

Many of them took a decided stand against the strike and used their influence in getting the men back to work. Manufacturers, store keepers, ministers and school teachers also received copies of these folders as well as other men and women of influential positions. The results were most satisfactory and this method of peaceful persuasion is believed to have had even better results than the court action.

The Schacht Motor Truck Co. states that though they have only 50 per cent of their normal force working they are getting 75 per cent of their normal output. This increased efficiency is said to be due to the fact that the men are now working without being hampered by the agitators. Other plants are having the same experience and they all believe their men will be more content and produce better results under the non-union plan than they did when members of the union.

Biltwell Receivers Seek Contract Relief

AKRON, Aug. 9—The receivers of the Biltwell Tire & Rubber Co., Barberton, Ohio, were in court here a few days ago asking for judicial advice with reference to a contract for more than $300,000 worth of crude rubber contracted for several months ago from the importing house of Edward Maurer Co., Inc., of New York. The contract called for period shipments including 90 tons for delivery in three shipments this fall at prices varying from 43 to 53 cents a pound, contract price, as against 32 cents, reported to the court to be the present spot cash price.

The court directed the receivers not to assume the contracts covering shipments due and past due and aggregating 23,000 lb. at the contract price, and reserved decision as to the shipments scheduled for the fall. Counsel for the New York concern urged that if the contention of the receivers is true, that the Biltwell is solvent, any order of the court nullifying the contract would result in a suit for damages against the receivers for any balance between the present price and the contract price, "and this would impose further burdens on the concern in litigation."

The receivers urged, on their part, that in the interest of economy in view of the present low market on rubber they be permitted to buy in the open market to supply the needs of the factory as it proceeded.

Good Roads Day

STARKVILLE, MISS., Aug. 9.—As a result of a mass meeting, Aug. 2, held here and attended by nearly 300 citizens of Oktibeha County, every able-bodied man in the county will devote Aug. 17 to work on the roads. All business and farming will be stopped and the men will turn out with their teams for road improvement. Captains have been appointed in 30 communities and the officials of the various towns in the county have issued proclamations declaring "Road Day" a holiday and urging all business houses, banks, etc., to close to give their employees a chance to work on the roads. The plan originated when the county board of supervisors announced that it had been unable to obtain sufficient labor to make the necessary repairs on the roads.

SAMSON FOUNDRY NEAR READY

JANESVILLE, WIS., Aug. 9—The mammoth gray iron foundry unit of the Samson Tractor Co.'s main works here is receiving its finishing touches and is expected to be ready to melt its first heat about Aug. 15 or 20. It will have a capacity of about 400 tons a day when all the cupolas are in operation. The malleable casting supply for the Samson works is provided by the Waukesha Malleable Iron Co. of Waukesha, Wis., which was taken over by General Motors on July 1. A malleable shop and an electric steel foundry will be added at Janesville within a year or two.

DE PALMA IN ELGIN RACE

CHICAGO, Aug. 7—Ralph De Palma will drive a Ballot car in the Elgin road race which is set for Aug. 21. To date this is the only European car in the race. Several slight changes have been made in the mechanism of the car since the Indianapolis race in which it caught fire when leading by five miles.

Buses Meet Test When Trolleys Quit

Possibilities of Motor Vehicles for Public Transportation Tested in Bridgeport

BRIDGEPORT, CONN., Aug. 6—Possibilities of passenger buses for transportation within cities are meeting a thorough test in this city, where all trolley cars were withdrawn from service by the traction company eleven days ago as the climax of a bitter controversy involving the right to exclusive operating rights along main thoroughfares.

Three hundred and fifty buses are engaged in the gigantic task of carrying the 150,000 daily fares of the city. They have met the test in a satisfactory manner, providing quicker transportation than the trolleys afforded and at lower fare. Furthermore, vehicle congestion has been found greatly lessened.

Complaints have been made of crowding and unsanitary conditions, but these are being eliminated as the service becomes less of an emergency nature and more of a permanent one. Bus owners are organizing for the maintenance of established running schedules and for the enforcement of cleanliness in the upkeep of the vehicles. Upon satisfactory public service, they realize, rests the success or failure of the opportunity.

Crowding is being lessened with the addition of more buses of a larger and better equipped type which carry from 25 to 35 passengers seated. Many owners are prepared to invest in these new type buses should public encouragement be continued. Viewing the situation as a whole it is evident the buses have impressed the public with their ability to provide safe, adequate and rapid transportation.

ONEIDA TO INCREASE OUTPUT

GREEN BAY, WIS., Aug. 9—The Oneida Motor Truck Co. is planning an increase of 50 to 75 per cent in production after Sept. 1, when a second unit of its works, duplicating the original shop built about three years ago, will go into operation. Factory No. 2 represents an investment of more than $275,000 and will provide facilities for making radiators, all sheet metal work and some instruments used in the Oneida truck.

PARIS AIR MAIL RATES DROP

PARIS, July 24—(*Special Correspondence*)—Aerial postal rates between Paris and London have been reduced to 4 cents in addition to the ordinary stamp of 5 cents, for letters weighing not more than 2 ounces. Up to the present the special fee for a letter sent by airplane from Paris to London has been 60 cents in addition to the ordinary postal fee of 5 cents. The drop is therefore from 65 to 9 cents per letter. For express delivery letters an additional fee of 12 cents is charged.

Chrysler to Steer Maxwell Affairs

Head of Committee at Banks' Request

Between $3,000,000 and $4,000,000 Provided to Carry Company Pending Reorganization

NEW YORK, Aug. 11.—Early return to normal operating conditions at the Maxwell and Chalmers plant is forecast as the result of action taken this week by all the interests connected with the two companies. These were the more important developments in the somewhat complicated situation.

1. Bankers for the Maxwell Motor Co. have advanced between $3,000,000 and $4,000,000 to tide it over until its affairs are reorganized on a permanent basis.

2. The affairs of the Maxwell company will be worked out by a management committee headed by Walter P. Chrysler, executive vice-president and general manager of the John N. Willys interests. He will be assisted in financing and reorganization plans by J. R. Harbeck, vice-president of the American Can Co., who also is closely allied with the Willys interests.

3. Because of existing conditions in the financial and business world, the joint committee representing the Maxwell and Chalmers companies has extended indefinitely the time for declaring operative the agreement under which the two companies would merge.

4. A new general manager will be employed for the Maxwell company, which is operating the Chalmers plant under lease. This man has not been selected and the final choice will rest with Chrysler.

Formal announcement of the temporary arrangement was made by the bankers yesterday in a formal statement, which said:

Dispel Rumors of Difficulties

"Rumors of difficulties surrounding the Maxwell Motor Co. and the closely allied Chalmers company are set at rest by announcement made to-day to the effect that a strong group represented by prominent financiers and leading factors in the automobile industry have taken hold of the company's affairs.

"It is stated that failure to promptly ratify the negotiations which have been for some months pending between the Maxwell and Chalmers interests has resulted in the postponement of the company's definite financial plans and that this has been responsible for the rather serious condition recently confronting the company. Assurances are given that with the joining of strong financial interests to the enterprise and the settlement of the negotiations between the two corporate interests there will be a speedy return to normal operating conditions.

"The affairs of the company are to be worked out through the medium of a management committee representing all interests. The committee is headed by Walter P. Chrysler, formerly vice-president of the General Motors Corp., and the recognized leading authority on automobile production. J. R. Harbeck, vice-president of the American Can Co., who is also closely allied with Mr. Chrysler in his various enterprises, is a member of the committee having to do with financing and reorganization plans.

New York Banks Prominent

Other members of the committee are George W. Davison, president of the Central Union Trust Co. of New York; B. F. Everett of Detroit; E. R. Tinker of the Chase National Bank of New York; Ralph Van Vechten of the Continental and Commercial National Bank of Chicago; James Leo Butzell, representing the First and Old Detroit National Bank, and other Detroit interests; James C. Brady and Hugh Chalmers."

It will be noted that this statement avoided reference to the fact that Chrysler and Harbeck were associated with the Willys interests. While one of the leading figures in the Willys group, Harbeck has no other automobile interests, so far as known, and it was the not unnatural assumption that the association of the two men with the Maxwell-Chalmers combination presaged another addition to the Willys enterprises. This assumption was vigorously denied to-day, however, by the banking interests involved. They said they sought the services of Chrysler because of his genius as a producer and those of Harbeck because of his recognized financial ability. To allay what they termed "any misunderstanding," the banking group gave out this statement:

Retains Willys Connection

"The new management committee of the Maxwell Motor Co. states that Walter P. Chrysler, who has recently become associated with the committee in connection with Maxwell Motor Co. affairs, has in no way discontinued his active connection with Willys-Overland. Mr. Chrysler continues as executive vice-president and general manager of the Willys interests. Owing to the important and successful work he has done in Willys-Overland, he has been asked by the banking interests to be a member of the committee recently formed to adjust the Maxwell affairs. This adjustment has nothing whatso-

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Slocum Applies for Temporary Receiver

Company Has $500,000 Surplus and $300,000 in Orders—Short Ready Cash

NEWARK, Aug. 10—Application for a temporary receivership was made by the Slocum, Avram & Slocum Laboratories, Inc., in United States District Court in Equity yesterday, to enable it to raise funds on receivers' certificates to tide it over the present short money period. The court appointed Arthur A. Kraeuter of Kraeuter & Co., Newark, as receiver representing the creditors, and Joseph L. Smith, attorney, to represent the company. They are authorized to raise $100,000 for immediate needs.

In a statement presented by the company in asking for the temporary receivership, assets are shown to total more than $1,000,000 and the surplus of the company over all debts and liabilities, $500,000. Contracts on hand were shown to total more than $300,000. The company manufactures automobile, engine and machine parts. The factory is in Newark and the general offices in New York City.

The application was made by the company as presenting the fairest means of protecting creditors, stockholders and others interested. It was declared that the receivership is expected to be of short duration.

Motor Trucks Keep Up Production of Steel

YOUNGSTOWN, Aug. 9—The steel plants in this district are remaining in operation largely because of the exceptional assistance in moving output which is being given by motor trucks.

It is a day-to-day fight, manufacturers assert, with accumulated production piling higher and higher as a result of the increased and maintained rate of operations obtaining for some time past. The outlook Friday was that plants would continue about as usual this week.

On a recent day 97 motor trucks were awaiting their turn to get material at a certain department of one of the local mills. At another establishment 50 trucks were recently standing in line awaiting loading turns. To a greater or lesser degree the situation obtains throughout the district.

Slump in Akron rubber operations has diverted large numbers of trucks to this city, which were formerly moving rubber manufactures. This timely assistance has helped the local mills materially.

Haynes Develops 2 Speedster Cars

Six and Twelve Cylinder Models with Many Refinements Added to Line

KOKOMO, IND., Aug. 9—Two speedster models, the No. 47, on a 6-cylinder chassis, and the No. 48, on a 12-cylinder chassis, have been announced by the Haynes Automobile Co. Individual fenders are an outstanding feature of the design. The front fenders are equipped with leather splash flaps. Aluminum steps are provided, instead of the usual running-boards. The equipment includes six wire wheels, the two extra wheels being carried up in the front, one at each side.

The speedster is of the two-passenger, two-door type, and is upholstered in Spanish leather, with an arm rest on each side of the seat. The windshield is of the all-aluminum type, rakish and low, and is provided with Shureloc wind deflectors. There are two rear vision mirrors, one on each side of the car, and two windshield cleaners are also included in the equipment.

In the rear deck of the speedster there are two carrying spaces. Directly back of the seat is a small compartment with a door on each side, which is intended for small packages such as thermos bottles, lunches, portfolios, books, etc. The main carrying space is unusually large, and both spaces are fitted with locks. The top is made of khaki colored material and there is a plate glass window in the rear quarter of the curtain.

These speedsters embody the metallic instrument board which is one of the features of the new series of Haynes cars. Instead of pressing a button for starting, the driver simply presses a small lever on the instrument board. The models are both painted red.

Simplicity Six Now on Pacific Coast Market

SEATTLE, WASH., Aug. 9—A new product of the Pacific Northwest is the Simplicity Six, which is just being placed on the market in the big cities of this section. It is an assembled product with a 6-cylinder Beaver engine, but also contains a number of original features. One of these is a transmission which is controlled by the clutch pedal and a lever on the steering gear. During the first 10 deg. motion of the pedal, the clutch is released, and during the next 10 deg. motion the gear is shifted from one position to the next. Another unusual feature is that both the service and the emergency brake are applied by a single pedal.

The body is of up-to-date design, with plywood frame and sheet aluminum panels. Originality is also evident in the spring design, the front springs being full elliptic and the rear springs a combination of full elliptic and cantilever springs, these latter being a patented design of the company. The wheel base of the car is 134 in. and the total weight under 3000 lb. The ignition equipment is Bosch, and a Bijur generator and starter are fitted.

Among the items of equipment may be mentioned two extra wheels of the steel disk type and two extra cord tires, two bumpers, two spotlights, wind deflectors for the windshield, adjustable tonneau windshield, two exhaust heaters, dome light, cigar lighter, complete instrument board mounted in Spanish leather under plate glass.

Winther Motors Adds Light Truck to Line

KENOSHA, WIS., Aug. 9—The Winther delivery special is a recent product of the Winther Motor Truck Co. This machine is designed for fast delivery work and is fitted to operate at passenger car speeds. It is equipped with Westinghouse electric starting, lighting and ignition, and pneumatic tires are used on both front and rear wheels.

The engine is a four cylinder, 3½ x 5 in., cast in block type with an actual output of 35 hp. A Stromberg 1 in. carbureter is used. The Warner three speed gearset and multiple disk clutch are mounted as a unit with the engine. The cooling is by a tabular core type radiator with thermo-siphon circulation. The frame is made of 5 in. rolled channels, 34 in. wide and extending 102 in. behind the driver's seat.

The wheelbase is 135 in. The springs are made of alloy steel and are semi-elliptic both front and rear. The service brake is on the rear wheels and operated by a pedal. The emergency brake is operated by a hand lever and mounted at the rear of the transmission. A 14 gal. gasoline tank is mounted under the driver's seat. The equipment furnished includes a transmission driven tire pump, a Buell explosion whistle, a Stewart-Warner speedometer and a windshield.

CURTISS TAKES OVER AIRDROME

NEW YORK, Aug. 9—The airdrome of the Curtiss Airplane & Motor Corp. at Mineola, which formerly was the army's Hazelhurst field, was opened formally Saturday. The company will attempt to make it the airport of New York. The field is one of the best equipped in the country and during the war was used by the army for the final training of pilots.

UNTRUE ADVERTISING ALLEGED

WASHINGTON, Aug. 7—Notice has been served on the Great Western Oil Co., Cleveland, on representations made to the Federal Trade Commission to-day, that the company had published untrue advertisements to the effect that a motor fuel manufactured by them had been indorsed by the Automobile Association of America and recommended by the Bureau of Mines.

Paris to Take Over All Traction Lines

Will Operate Buses and Tramways Under Central Control—Cost $195,120,000

PARIS, Aug 1 (*Special Correspondence*)—All the Paris and district surface traction lines, comprising five tramway companies and the General Omnibus Co., are about to be purchased by the city at a cost of $195,120,000, payable in thirty annuities. The biggest single amount is a thirty-year annuity of $3,360,000, to be paid to the Paris General Omnibus Co., a body which, in addition to having a monopoly of the omnibus service of Paris also holds a concession for a certain number of tramway lines.

It is not the intention of the City of Paris to run the tramway and omnibus lines itself, but to form an operating company, of which M. André Mariage, at present general manager of the omnibus company, will be the head. This company will be constituted for a period of thirty years, and will have a capital of $12,000,000, of which $1,200,000 will form a guarantee fund, the rest being used as working capital and for the purchase of supplies from the existing companies.

The operating company will be guaranteed a fixed interest of 6 per cent, reduced to about 4.9 per cent by reason of taxes. To give the organization a commercial character, the company will be given a premium on the receipts and a premium on economies in operation. It is also arranged that tramway and omnibus workers shall be allowed to take up shares in the new company and shall be interested in the receipts and in economy of operation.

Buses to Develop Routes

The intention of the new company, which will replace the six now running Paris and district surface lines, is to extend the tramway services as far as possible and make use of omnibuses for linking up the different lines or for routes which are not sufficiently developed to justify the laying down of tracks. Valuable economies and important improvements can be effected, for up to the present the transportation service of the city of Paris has been handicapped by old-time restrictions.

Each of the six companies had its own territory and was not interested in service outside that district. Further, the City of Paris, artificially bound in by military walls, was averse to developing traction outside the city, under the idea that this would develop the suburbs to the detriment of the city. Central generating stations will now be erected instead of the six independent stations employed up to the present, and there will be but one organizing staff instead of six. General economies in operation under joint control were the factors influencing the taking over by the city.

Louisiana Adopts Theft-Proof Law

Title to Cars Will Be Recorded Same as Real Estate and Will Legalize Sales

NEW ORLEANS, Aug. 9—A law which provides for the registration of automobile sales much after the manner of the registration of real estate and calculated to put a curb on the steadily increasing number of thefts, has been passed by the Louisiana State Legislature, and becomes effective Sept. 1.

The new law provides that all sales or transfers of automobiles shall be evidenced by an authentic act recorded in the parish in which the sale is made; that every act of sale or transfer of an automobile shall state the year of manufacture of the car, the price thereof, the style and model, the number, size, make and power of the engine, and the name and address of the person from whom the seller acquired the car, as well as the place and time of record of the seller's title.

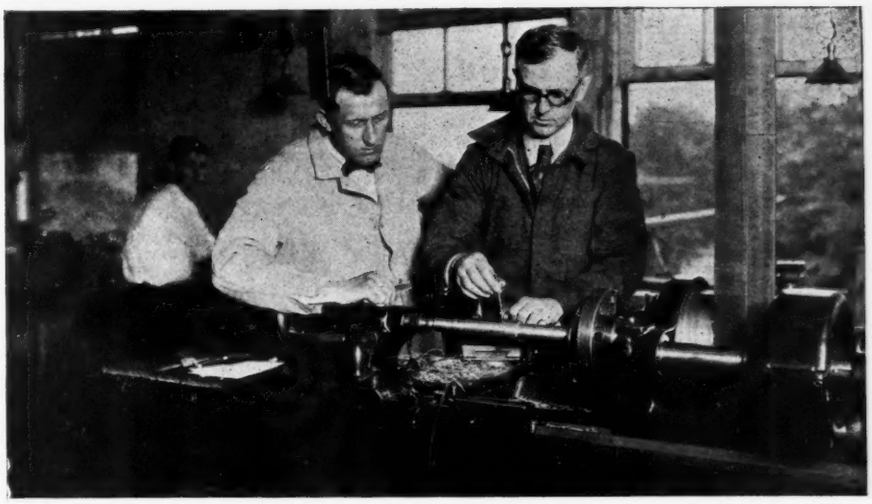
It is provided that the buyer shall retain in his possession a certified copy of the act of sale or transfer by which he acquired the automobile with a notation of the time and place of the recording of the original record over the signature of the proper custodian. In the event of a re-sale of the automobile this copy shall be placed in the possession of the buyer, and, in turn, of every buyer thereafter if the automobile is sold a number of times. In this way a complete chain of title to the automobile will be in the possession of the owner at all times and if he has not this chain of titles the chances will be large that he is not the owner.

In the case of all automobiles owned in the state at the time of the promulgation of this law (Sept. 1), and all new cars in the possession of dealers, and for sale for the first time, it is further provided that the present owners, or dealers, shall make affidavit of ownership, which affidavit, being filed in the records of the parish shall serve in lieu of an authentic act of sale or transfer when the automobile is sold, and shall stand as the first link in the chain of titles to the car.

MOUNTAIN TEST FOR TRACTORS

PARIS, Aug. 1 (*Special Correspondence*)—A mountain tractor competition is announced by the Automobile Club of France for the beginning of 1921. There will be three distinct events—snow plowing, passenger carrying over snow and the haulage of tools and of machinery for road maintenance. The first two trials will take place in the mountains, and the third in the suburbs of Paris.

This competition had its origin in a suggestion put forth last year immediately after the Alpine tank trials near Mont Blanc, that tanks could be used for passenger service over snowclad mountains. It was pointed out at that time that holiday resorts in the mountains could be enormously benefitted if some more reliable means of transportation existed than horse-drawn sleighs. The idea at that time was that self-track laying machines would be developed, but since then it has been shown that many agricultural tractors of the wheel type are as capable of working on snow as the creeper band machine. This competition appears likely to initiate the use of snow tractors in the many popular mountain resorts possessed by France in the Vosges, the Alps, and the Pyrenees.



F. M. Davenport at Work in Franklin Shops

Industrial relations are being made the subject of an intimate study by this New York legislator and instructor of economics at Hamilton College. He is here pictured at a lathe in the machine shop

STEINMETZ ORGANIZER SUES

NEW YORK, Aug. 10—Suit has been filed in Supreme Court by Patrick Hirsch, a promoter, against Charles P. Steinmetz, consulting engineer of the General Electric Co., to recover $75,000 for breach of contract. Hirsch alleges that Steinmetz sought his aid in forming the Steinmetz Electric Motor Car Corp., which will build electric trucks at Baltimore. Hirsch says he interested bankers in the organization of the company. He asserts he was to have received 25 per cent of the common stock and the metropolitan agency for the car. His complaint is that Steinmetz paid him nothing for his services. According to Hirsch, the bankers were to get 51 per cent of the stock and Steinmetz 24 per cent.

CREDITORS MUST FILE CLAIMS

CLEVELAND, Aug. 10—Creditors of the Forest City Machine & Forge Co. have been directed by the United States District Court to file their claims with Francis W. Treadway, counsel of the receiver, before Sept. 15. If the claims are not filed by that time competitors will be debarred from participating in any dividends or distribution of assets which may be made.

Legislator Studies Factory Relations

Franklin Organization Under Observance of F. M. Davenport, Economist and Leader

SYRACUSE, Aug. 9—Any wise settlement of the industrial problem must be largely a matter of employers and employees dealing with each other on the manhood plan, says Frederick M. Davenport, member of the New York State Senate from Oneida district, who is working as a laborer in the Franklin automobile factory here to study industrial relations.

Studying and teaching political economy at Hamilton College, Davenport is an authority concerning industry. He was born in Salem, Mass., and studied at Wesleyan University and Columbia. Since 1904 he has been teaching law, politics and economics at Hamilton.

Davenport went to the Franklin plant at the suggestion of H. H. Franklin, president of the company, who became interested in Davenport's activities at Albany toward the establishment of better industrial relations.

"It is a great summer," says Davenport, "I wouldn't miss it for anything. Some of the finest types of men that I have ever met anywhere are to be found among the workers in this plant. You could get out of their minds and experience, and the experience of many thousands in America like them, good sense and ideas sufficient to run this country better than politicians ever can run it."

After several weeks of close contact with the working man at his bench Senator Davenport has made observations which, he declares, will govern his future attitude on the co-relation of industries and the position of employee and employer.

Gasoline Analysis Shows Quality Poor

Bureau of Mines Report Finds Evidences of Adulteration and Poor Refining

WASHINGTON, Aug. 11—Analytical results of the second semi-annual gasoline survey conducted by the Bureau of Mines show that there has been a greater decrease in the volatility of motor gasoline than can be accounted for as the normal change from winter to summer quality. These findings apparently bear out the contention of automobile manufacturers and dealers that the low grade gasoline now being sold throughout the country is chiefly responsible for the complaints made by automobile users.

Samples of motor gasoline were collected from seven cities to obtain a grand average for the country. Judging from the eighty-two samples there were many evidences of adulteration with kerosene. Likewise, the Federal investigators found many samples indicating very careless refining if not actual adulteration. From a standpoint of an increase in the average boiling point of the gasolines, San Francisco ranks first in quality. The average boiling point of this product in the Pacific Coast city is 270 deg. Fahr.; New York ranked second with a standing of 272 deg. Fahr.; Pittsburgh and Chicago were tied for third place; Washington, New Orleans and Salt Lake City had the poorer grades of gasoline.

The reason for the failure of automobile engines to function properly is explained in a statement from the Bureau of Mines that samples of motor gasoline were found which contained so much high-boiling material that it was impossible to determine the end point by means of the standard distillation thermometer which covers a range up to 518 deg. Fahr.

CONNECT ISLANDS BY PLANE

WASHINGTON, Aug. 9—The Post Office Department is considering establishment of an aerial mail route between Mayaguez, P. R., and Santo Domingo City, S. D., by seaplanes, a distance of 185 miles, on twice a week schedule. The mails for Santo Domingo from New York are sent via San Juan, P. R., and then dispatched by sailing vessels or steamers which depart irregularly and require about 30 hours as compared with 3½ hours by seaplane.

CRUDE OIL TRACTOR SOUGHT

WASHINGTON, Aug. 7—American commercial attachés have reported to the Department of Commerce on the increased use of motor plows in European countries. According to information obtained from Swedish manufacturers, a tractor is now in general demand in European countries which will use crude oil instead of petrol or benzol.

The number of Swedish tractors manufactured for Austria continues to grow. European countries have been importing these machines in large numbers principally because of the cheapness in operation. Gasoline which is ordinarily used in tractors made in this country must be imported, and the high costs of fuel hinder the sale of this equipment.

Essex Makes Record in Special Mail Trip

NEW YORK, Aug. 10—An Essex stock car carrying mail under special Government authority completed a trip from San Francisco to New York at 5:40 p. m. yesterday, having covered the distance in 4 days, 14 hours and 52 minutes. This is said to establish a new transcontinental record. E. V. Rippingalle, the Essex engineer, directed the trip. The 25 drivers used all were sworn in as special mail carriers. They wired from each relay station and made affidavits for the Government records. The route was divided into ten zones, each in charge of an Essex distributer. The Government permit called for two trips each way and the second car reached San Francisco to-night from New York. The third left this city last night and the fourth started from the coast to-night.

Louisiana Requires Dealers to Carry Parts

BATON ROUGE, LA., Aug. 7—A bill passed at the recent session of the Louisiana Legislature, which will become effective Aug. 1, provides that all dealers in agricultural implements must carry at all times a full line of parts for these implements. While this bill was aimed to protect the farmer who purchases a plow, a cultivator or some other implement and then has to lose two or three weeks in the middle of the planting season, sending to New Orleans or some other city for a replacement, the joker in it is that all dealers in trucks and tractors will have to carry complete lines of repair parts for such automotive vehicles, even though he does not sell more than two tractors or a couple of trucks in a year. The larger distributers in New Orleans are rather in favor of the law, but the smaller dealers in the country claim that many of them will have to discontinue handling trucks and tractors, as they will have too much money tied up in parts.

CREDITORS TO MANAGE SINCLAIR

SPRINGFIELD, MASS., Aug. 10—At a general meeting of the creditors of the Sinclair Motors Corp., held here with about seventy-five present, a committee of three was appointed to manage the affairs of the company. This committee is headed by Sidney S. Meyers, general counsel of the Motor & Accessory Manufacturers Association. The committee will endeavor to work out some plan by which operation of the plant can be continued.

Chrysler to Steer Maxwell Affairs

Heads Committee at Bank's Request—Working Capital Provided Under Arrangement

(*Continued from page* 343)

ever to do with any of the Willys companies and no combination of Willys and Maxwell interests is contemplated."

An almost identical statement was forthcoming from the Willys executive offices. A similar assertion was made at the offices of Harbeck. Unless they are represented by Harbeck and Chrysler, the committee does not indicate that any new financial interests have become connected with the Maxwell enterprise. It is assumed that those referred to in the bank statement are the banks themselves, for they are the heaviest creditors of the Maxwell company. The merchandise creditors are represented by Everett, who has been mentioned as the new general manager to succeed C. C. Hanch, but who declined the post. Everett is a parts maker who formerly headed the E-M-F company. The Brady interests are heavy holders of Maxwell securities, and Chalmers is the sole representative of the Chalmers company on the committee.

Early announcement is expected of the reorganization plans. The joint committee headed by Harry Bronner, representing Maxwell and Chalmers, says:

"The committee has been in conference with financial and business interests as well as with creditors of the Maxwell company regarding plans for the supply of new money urgently required for the readjustment or reorganization of the Maxwell and Chalmers companies and the management of their respective properties. The committee believes that in the near future a modified plan, the general features of which have already received the approval of the interests consulted, may be formulated for the approval of certificate holders and creditors."

After explaining that the life of the merger agreement has been extended indefinitely, the committee states that holders of certificates of deposit may withdraw from the plan at any time before Aug. 31, but not after that date.

CORRECTION

In its account last week of a preliminary meeting of creditors of the Sinclair Motors Corp., it was stated by AUTOMOTIVE INDUSTRIES that the Sinclair is a reorganization of the Militor Motors Co., which was a merger of the Knox Motors Co. and the Militor Corp. Such a merger was proposed more than a year ago but never was consummated. The Knox Motors Co. sold certain property to the Sinclair interests but continued business as an entirely separate entity and is now manufacturing and shipping road tractors, truck, tractor and marine motors and parts.

INDUSTRIAL NOTES

Oxweld Acetylene Co. has removed its export department from the factory at Newark to the Carbon and Carbide Building, New York. The department has been reorganized and is now under the direction of R. G. Noble. The company has established Pacific Coast sales and distributing headquarters at 1077 Mission Street, San Francisco.

Paragon Tire & Rubber Co., recently organized, is seeking a factory site in Columbus, Ohio. Officers of the company are Henry J. Evon, president; Jay J. Caine, vice-president and director of sales; George W. Herrick, vice-president in charge of engineering, and Roy W. Shaw, secretary-treasurer.

Central Malleable Castings Co. has been organized by President Drozesk of the Saginaw Malleable Iron Co., a subsidiary of the General Motors Corp. The new company has purchased the Franklin Park Foundry Co. at Franklin Park, near Chicago.

Peters Motor Corp. has removed from Pleasantville, N. J., to Trenton, where it has secured the factory formerly occupied by the Reeves-Cubberley Engine Co. After some minor alterations the company will begin the manuafcture of the Peters car.

Erie Motor Truck Mfg. Co., Erie, Pa., has its new plant 80 per cent completed and is assured by contractors that it will be ready for occupancy in about a month. About 200 persons will be employed in the first unit.

Rex Machine Co., Chicago, has changed its name to the Sundstrom Mfg. Co. There is no change in either the personnel or management of the company.

TRUCK SALES COMBINED

MENOMINEE, MICH., Aug. 9—The Menominee line of trucks recently acquired by stockholders of the Four Wheel Drive Automobile Co. will be handled by the present distributers of FWD trucks, in conjunction with other Menominee dealers being established throughout the country. The Menominee line embraces 1, 1½, 2 and 5-ton models.

Work on the new Menominee factory which is being erected in the vicinity of the Four Wheel Drive plant in Clintonville is being rapidly completed and it is expected that within a short time the reorganized Menominee Truck Co. of Wisconsin will move its entire force of workers and machinery to its new headquarters, where production will begin on an increased scale.

MAXWELL DISTRIBUTER CHANGES

NEW YORK, Aug. 7.—The Maxwell Distributing Corp., organized to handle Maxwell and Chalmers sales and service in New York territory, to-day elected B. A. Lyman, president; Harry J. De Bear, vice-president and general manager, and Walter M. Anthony, treasurer. Lyman is director of sales of Maxwell Motor Sales Corp., Anthony is treasurer of the same company, and De Bear for several years has been manager of its New York branch. The distributing corporation succeeds the branch as New York representative and will operate practically as a distributer of Maxwell cars and trucks and Chalmers cars. Hitherto, De Bear, as branch manager, has managed sales in the territory, but service has been under direct control of the factory.

Aerothrust Company Develops New Engine

LAPORTE, IND., Aug. 9—A light two-cylinder, two-cycle engine has been developed for use as a binder or general utility engine, by the Aerothrust Engine Co. The engine is designed to be removed from the binder and employed in other work. For this purpose a light base is provided with four holes for bolting to the floor or other support.

The engine is rated at 5 hp. and is fitted with a governor that acts whether the engine is running at full load or light. It is claimed the engine will bring in any crop, no matter how heavy or how wet. The two cylinders are opposed and both fire at the same time. Cooling is by air and circulation is furnished by blades on the flywheel. The engine is equipped with a clutch so designed that it can be thrown in or out without sudden jar to the binder machinery. The cylinder size is 3 x 3½ in. Kerosene is used for running with a switch-over to gasoline for stopping and starting. The lubricating oil is mixed with the fuel in addition to being supplied to the main bearings directly. The magneto is contained in the flywheel.

The engine also is furnished in a three-horsepower model with 2½ x 2¼ in. cylinders. The other features are the same. Both of these engines can be furnished with accessory equipment such as centrifugal pumps, lighting plants and saw rigs.

ANDREW MOTOR CHANGES TITLE

MILWAUKEE, Aug. 9—The Andrew Motor Mfg. Co., which recently was taken over by the members of the Wehr Steel Co., a large electric steel foundry concern in Milwaukee, has undergone a change of style to Andrew Mfg. Co. It originally was established to manufacture rowboat motors and small gas engines, but for some time has been conducted as a jobbing machine shop on automotive parts. This work will be continued and the shop will also handle machine work for the Wehr company. C. Frederic Wehr is secretary of the Andrew company.

GAS ENGINE CONVENTION

CHICAGO, Aug. 9—The National Gas Engine Association will hold its thirteenth annual convention at the Congress Hotel in this city, Sept. 1, 2 and 3. The convention program is one of unusual interest. The morning sessions will be general meetings open to all members while the various sections will hold their meetings in the afternoon. The headquarters of the association are in the Monadnock building and George F. Fuller, the secretary, is in charge of the convention arrangements.

METAL MARKETS

Cost accounting may be looked upon generally as one of the exact sciences but the last few days' experience with reference to the increased burdens which iron and steel consumers will have to bear as a result of the advance in freight rates, has shown it to be a very relative one. The advance in pig iron costs is estimated to cover the wide range of $1.25 to $2 per ton, it all depending whether, in computing the higher cost, the advance in freight rates is applied solely to ore, coke, and other raw materials, such as limestone, or whether the increase in the freight on such material as may be needed for relining the furnaces and the increase in the furnace owner's business traveling expenses are also taken into account. This, of course, does not include the advance in the freight on the finished pig which the consumer will have to pay. As for the advance in the cost of finished steel products, the per ton increase will naturally be greater than in pig iron. Talk in the sales offices of independent producers in the last few days has centered around speculation just how long the United States Steel Corp. will continue to adhere to its base prices which continue to remain those announced on March 20, 1919 in agreement with the industrial board of the Department of Commerce. That these prices are out of gear, it is argued, is shown most impressively by the fact that the price for basic pig iron approved by the industrial board was $25.75 and the present market price is about $46.50. On the other hand, purchasing agents are of the opinion that the freer flow of material resulting from the quickened freight transportation, should more than offset the freight advances. Meanwhile iron and steel buying by other than railroads, is a hand to mouth affair.

Pig Iron—Pittsburgh reports sales of No. 2 foundry at $47, valley furnace. Southern iron is selling at $42, Birmingham. In spite of the assertion by a Buffalo pig iron interest that nothing less than $50 would do as a next year's price level, 1,000 tons of foundry were sold there a few days ago at $45.

Steel—Automotive interests have been inquiring for early deliveries of small size cold finished steel bars. Hot rolled strip steel demand has slumped off in consequence of automotive interests being apathetic. It is reported that one or two large builders of cheap passenger cars have taken on additional tonnages of sheet bars for conversion at around $70 to $75 for open hearth. Tin plate makers have bought at as low as $67 in the last few weeks. Youngstown rolling mills claim to be sold out on sheets over the current year. Chicago reports state that demand for automotive bolts and nuts has lessened. Bolt and nut manufacturers are discussing announcements of early upward price revisions.

Aluminum—The market is quiet and steady. A heavy decline in exports of both ingots and sheets is disclosed by Government figures just published. The resale market, however, is in light supply and no selling pressure in evidence.

Zinc—Holders of spot metal are not pressing it on the market, intending to take advantage of the advance which, they figure, higher freight rates will bring.

Tin—The slump in sterling exchange was accompanied by corresponding advances in tin quotations in London. Consumers are not interested.

Lead—Spot lead has been sold at 9c., New York, and some English metal offered at that figure, on dock. Mexican lead is beginning to arrive again.

Copper—Not even the spectre of a fresh war lifted the market out of its rut, sellers at 18½c. being plentiful.

FINANCIAL NOTES

B. F. Goodrich Co.'s net profits of $7,600,000 before Federal taxes for the six months ended June 30, represent a decline of $100,000 from net profits of $7,700,000 for the corresponding period last year. Sales in the present year were approximately $20,000,000 greater than in 1919 but profits were reduced owing to increased costs of raw material. On estimated sales of $90,000,000 in the first half of this year net profits, after preferred dividends, but before Federal taxes, were at the annual rate of $21.60 a share on the 600,000 shares of no par value common stock. This compares with $25.09 a share earned in 1919.

Gramm-Bernstein Motor Truck Co.—Directors have declared a dividend of 50 per cent out of surplus earnings to common stock holders and voted to increase the capitalization from $1,500,000 to $5,000,000, the entire amount to be issued as common stock. The company has averaged 25 per cent on its common shares for the past five years and heretofore has been closely controlled for Gramm and Bernstein. Enlarged demands for the company's trucks is said to have been responsible for the decision to provide additional working capital.

Hartford Automotive Parts Co. reports net sales for the first six months of 1920 as totalling $851,585.68, an increase of $257,407.54 over the corresponding period of 1919. After reserves for taxes the net income was $120,113.05, compared with $94,970.19 in 1919. During the past fifteen months the company has turned back into the business an amount equivalent to 37 per cent on the common stock.

United States Rubber Co. reports net sales of $129,588,986 in the six months ended June 30, an increase of $30,099.615 over the corresponding period last year. The net income after deducting interest charges and providing for depreciation and Federal taxes, was $13,690,924. Profit for the period was $3,059,490 larger than in the first half of 1919.

Globe Metal Products Co. of Sheboygan, Wis., conducting a foundry and machine shop producing material and parts for the automotive and agricultural implement industries, has increased its capital stock from $200,000 to $300,000 to accommodate the growth of the business and finance future extensions of the facilities.

Lee Rubber & Tire Co. reports for the first six months of 1920, net profits before taxes of $510,923 equal to $3.40 a share earned on the 150,000 shares of no par value. Sales for the six months were $4,383,000 against $2,597,000 in the corresponding period last year. Working capital on June 30 was approximately $4,487,000.

Romort Mfg. Co. of Oakfield, near Fond du Lac, Wis., has increased its capitalization from $100,000 to $150,000. It is a large manufacturer of combination air and water service appliances for garages, as well as of air valves used in inflating tires.

Lincoln Motor Co.—Application has been made by the company to list $8,000,000 of Class A stock on the New York stock exchange. It was inadvertently stated by AUTOMOTIVE INDUSTRIES that the application was to list Class B stock. No such application has been made.

F. H. Lynch Tire & Rubber Co., newly organized with a capital of $500,000 will build a factory at Carthage, Mo., which is to have a daily output of 300 tires and 400 tubes. The factory will employ about 225 persons.

Morgan Mfg. Co., Chester, Pa., has been organized by James L. Morgan, formerly with the Adair-Heyl Motors Co., Philadelphia, to manufacture automobiles. The company is capitalized at $3,000,000.

American La France Engine Co.—Statement for the second quarter of 1920 shows an operative profit of $275,231 which left a net income of $241,168 after taxes, interest, etc.

Hayes-Ionia Co., manufacturers of automobile bodies and parts, has declared a stock dividend of 50 per cent as of July 1.

Goodyear Tire & Rubber Co.—Sales for July were $17,185,113 as compared with $15,989,349 for the same month last year.

C. G. Spring to Sell Shares of New Stock

KALAMAZOO, MICH., Aug. 3—The new C. G. Spring Co., which will succeed the Kalamazoo Spring Co. on Sept. 1, has been granted permission by the Michigan Securities Commission to dispose of its stock. The new concern has an authorized capital of $1,000,000 preferred and 10,000 shares of common of no par value. A portion of the preferred and common stock has been placed on the market, the balance of the common and a large percentage of the preferred being held by Christian Girl. J. G. Utz, consulting engineer and formerly associated with Girl in the Standard Parts Co., is one of the directors of the concern. Girl reports that production of the spring company has increased 25 per cent during the past two months. The business of the concern is devoted to the manufacture of automobile, carriage and truck springs, the former two composing the majority of orders.

Ryan Sues Exchange for $1,000,000 Damages

NEW YORK, Aug. 9—A suit charging conspiracy, in which he demands $1,000,000 damages, has been filed by Allan A. Ryan against William H. Remick as president of the New York Stock Exchange and members of the governing committee. The conspiracy allegation is the outgrowth of the action taken by the defendants in barring stock of the Stutz Motor Car Co. from the exchange after the famous corner in that stock and the subsequent expulsion of Ryan from the exchange. Ryan charges that members of the Governing Committee sold Stutz stock short and were either obligated to make deliveries or had borrowed Stutz stock to do so.

WAUKESHA DOUBLES CAPITAL

WAUKESHA, WIS., Aug. 9.—The Waukesha Motor Co., one of the largest manufacturers of heavy-duty motors for trucks, tractors, etc., in the Middle West, has increased its authorized capitalization from $1,000,000 to $2,000,000. The new issue will be absorbed principally by the original stockholders and the proceeds will be used for financing further extensions of production and the general growth of the business. Harry L. Horning is president and chief engineer.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Aug. 11—The general tendency of local call money rates last week was downward, the range of rates being from 6 per cent to 8 per cent, compared with a range of 7 per cent to 10 per cent the week before. The situation in the time money market remains essentially unchanged, and accordingly the movement of the call rates does not reflect any fundamental easing of the credit stringency.

The technical position of the Clearing House institutions has been improved. After two consecutive weekly statements showing reserves below legal requirements, on Saturday the combined reserves were $15,171,120 in excess of the legal minimum. Loans were lower than a week earlier by $45,515,000 and demand deposits were lower by $52,887,000. The item bills payable, rediscounts, etc., however, increased $20,654,000 to $1,108,904,000, the highest figure attained in almost five months.

As in the week before, the Federal Reserve Banks failed to retain fully the gains in technical position previously reported. While there was a slight gain in cash—$2,901,000 in gold and $3,104,000 in total reserves—and net deposits increased only $727,000, bills on hand increased $52,288,000 and Federal Reserve note circulation expanded $21,723,000. The result was a slight decline in the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against net deposits, from 49.2 per cent to 48.9 per cent. There was only a moderate increase in the discounts of the New York, Boston and Cleveland banks for six other reserve banks, from $138,700,000 to $150,900,000.

Bank clearings for July reflect, when account is taken of the price levels, the slackening of business activity in some sections of the country. The total for 178 cities, $37,485,488,920, is about $800,000,000 below the June clearings and about $28,000,000 under those for July, 1919.

Government reports of crop conditions show generally sustained improvement. Based on the condition of the cotton crop as of July 25, the revised forecast is for a yield of 12,519,000 bales, comparing with an estimated yield of 11,450,000 a month earlier. Based on condition as of Aug. 1, compared with that on July 1, there is an increase of 15,000,000 bushels in estimated yield of winter wheat, a decrease of 29,000,000 bushels of spring wheat, and an increase of 224,000,000 bushels of corn.

PALMER RECEIVER NAMED

DETROIT, Aug. 9—Curtis Gray of Muskegon has been appointed temporary receiver of the Palmer Tire & Rubber Co. of St. Joseph on application of creditors who allege the company has liabilities of $106,000, with assets of $46,000.

Men of the Industry

R. Jackson Jones has been appointed European representative of the Traffic Motor Truck Corp. and has established an office in London. For the last year he has been assistant to Harry H. Hawke, general sales manager of the corporation. J. Albert McCollum has suceeded Jones as assistant to Hawke and Millard S. Binney, formerly with the Chalmers Motor Car Co. and later with an Omaha advertising agency has been made advertising manager to succeed McCollum.

Guy F. Henry has been promoted to chief engineer of the Studebaker Corp. succeeding F. M. Zeder, resigned. Vincent Link designer of the new light six continues with the company as consulting engineer. Henry is a graduate of Ann Arbor, 1901, and has held important executive positions in manufacturing and engineering departments in the last nine years. Zeder has joined the engineering department of Willys-Overland.

J. S. Critchley, who represented the British government in this country all through the war in the purchase of motor trucks, has opened offices as a consulting engineer at 3 George Street, Hanover Square, London. Critchley, who formerly was president of the British Institute of Automobile Engineers, is widely known in the United States, where he spent nearly five years, sailing for home only last fall.

L. E. Wagner, for many years corporation sales manager for the Diamond T Motor Car Co., has become sales manager for the Chicago Oneida Co. Prior to his connection with Diamond T, Wagner was associated with Edison, Baker and Detroit Electric. W. J. Burns will be connected with the factory organization as transportation consultant.

James T. Lee has been added to the engineering staff of the Southwark Foundry & Machine Co., Philadelphia. Lee for several years past was vice-president in charge of sales of the Hanna Engineering Works, Chicago. The company plans to extend its line of hydraulic and power machinery.

W. A. Olen, president of the Four Wheel Drive Automobile Co., Clintonville, Wis., with D. J. Rohrer and C. F. Folkman, members of the Board of Directors, will sail for England this week in the interest of the company's foreign business.

Raymond Hawley has been elected vice-president of Technical Advertising Service, Inc. Hawley was formerly with the Keystone Motor Truck Corp., Philadelphia, and with other companies in the domestic and foreign field.

W. E. Duersten, vice-president of the New Castle Rubber Co., has been elected president by the directors. He also will serve as general manager. The plant of the company is being enlarged to make possible greater production.

A. R. Crapo has resigned as advertising manager of Gray & Davis, Inc., Boston, owing to the sales consolidation of that company with Bosch Magneto Co. His plans for the future are yet undecided.

George T. Bryant has severed his connection with the Hide Leather Belting Co., Indianapolis, to become director of foreign sales for Robert H. Hassler, Inc., of Indianapolis.

Charles P. Hennessy has been appointed sales manager and Carl H. Page, director of sales and advertising, of the Saxon Motor Car Corp.

A. F. Bassett has been appointed sales engineer of the Hyatt Roller Bearing Co., motor bearings division, in the Detroit district.

William D. Horne, Jr., formerly associated with the Locomobile Co., Bridgeport, has joined the Eaton Axle Co. sales force.

Dunlop Organizes Operating Personnel

BUFFALO, Aug. 10—Announcement is made by Perry D. Saylor, vice-president and general manager of the Dunlop Tire & Rubber Co. of America, that the entire plant, which covers 40 acres, will be devoted to the production of pneumatic cord tires, solid tires and inner tubes. Present plants do not include manufacture of fabric tires. Notwithstanding present conditions in the tire market the company expects to be in production within 60 days. At the beginning about 7000 workmen will be employed and this number ultimately will be increased to 10,000.

The company now is organizing its staff and these appointments already have been made: Factory manager, George R. Johnson; engineering manager, John Flower; production manager, C. R. Redfield; sales manager, C. L. Landon; director of industrial relations, C. P. Berner. Flower and Landon formerly were Goodyear executives and it is reported several other Goodyear men have gone with the Dunlop company.

MOTOR BOAT CROSSES OCEAN

NEW YORK, Aug. 10—A cable message has been received by the Class Journal Co. announcing the safe arrival at Cowes, England, of William Washburn Nutting, managing editor of *Motor Boat*, after a 22-day trip across the Atlantic in the 15-ton ketch Typhoon auxiliary-rigged, only 35 ft. long on the water line. She is equipped with one of the new Mianus heavy oil engines. The Typhoon was built at Nutting's suggestion to prove that a small boat, properly designed, could prove just as seaworthy as a big ship. This was proven when the little craft rode out a gale off the Newfoundland coast. Nutting will report the international motor boat races for *Motor Boat*.

HUMPHREY SUCCEEDS BACON

EAST PALESTINE, OHIO, Aug. 10—C. E. Humphrey has been promoted to the position of general sales manager of the McGraw Tire & Rubber Co., to succeed H. M. Bacon, resigned. Pumphrey has been with the company seven years. Several other changes have been made in the McGraw sales personnel. W. H. Hurley, manager of the New York branch, becomes assistant sales manager, while W. A. Brady, who has been connected with the New York branch, assumes the management of that territory. G. E. Bovis, Cleveland manager, will go to Chicago to take the place of H. G. Couturier, who becomes sales promotion manager. R. I. Winterringer of Boston takes charge of the Cleveland territory, while W. P. McGlynn assumes the Boston post.

Packard Raises Prices on New Truck Schedule

DETROIT, Aug. 9—New Packard truck prices, which will become effective with the elimination of one or two sizes within the next 30 days, are announced as follows: Solid tires, size E. C., standard chassis, $3,850, f.o.b. Detroit. Size E. C., long wheel base, $3,925. Size E. D., standard chassis, $4,900. Size E. D., long wheel base, $4,975. Size E. F., standard chassis, $5,950. Size E. F., long wheel base, $6,025.

Pneumatic tires, size E. X., standard chassis, $4,650. Size E. X., long wheel base, $4,725. Size E. Y., standard chassis, $6,050. Size E. Y., long wheel base, $6,125.

The old schedule called for completion of the year's allotment about Aug. 1, but many delays were encountered in production and it will be about Sept. 1 before the schedule is complete.

There will be no change in the models, the new schedule simply eliminating some of them.

RELIANCE ELECTS OFFICERS

APPLETON, WIS., Aug. 9—Officers of the Reliance Motor Truck Co. have been elected as follows: A. G. Brusewitz, president and general manager; Charles Schmidt, vice-president; H. Hupfauf, secretary; W. G. Jamison, treasurer; H. A. Wagner, production manager. The directors, in addition to the officers, are Matt Rossmeissl, Wolford P. Treml, Charles Schmidt, William Geenen, John Heenan and Harry Leppla.

NO GAS FOR BALLOON RACE

INDIANAPOLIS, Aug. 10—Citizens Gas Co. has notified the management of the National and International balloon races, scheduled for this city Sept. 11 and Oct. 13, that it will not furnish gas for the competitors. The decision of the company is that under present conditions it would be little short of criminal to provide gas for anything except necessary purposes. Entries for the national races have been received from the Governments of the United States, Italy, France and Great Britain, as well as many individuals.

AERO CLUB SUSPENDS MEMBER

NEW YORK, Aug. 9—The Board of Governors of the Aero Club of America has suspended Henry Woodhouse, one of the members, because of the suit he recently filed against other members of the board who were trying to bring about the consolidation of the Aero Club and the American Flying Club.

Calendar

SHOWS

Aug. 23-27—San Francisco, National Traffic Officers' Safety First Exposition, Auditorium, C. De Witt De Mar, Manager.

Aug. 25-Sept. 3—Des Moines, Annual Fall Automobile Show in connection with Iowa State Fair, C. G. Van Vliet, Mgr.

Aug. 28-Sept. 11—Toronto, Canada, National Automobile Show, Automotive Industries of Canada, in connection with Canadian National Exhibition, Exhibition City.

Aug. 30-Sept. 4—Milwaukee, Annual Automobile Show in conjunction with Wisconsin State Fair.

Sept. 6-11—Indianapolis, Twentieth Annual Fall Automobile Show in connection with Indiana State Fair.

Sept. 18-25—Cincinnati, Annual Automobile Show, Passenger cars only, Cincinnati Automobile Dealers' Ass'n. Music Hall Buildings.

Sept. 20-26—Los Angeles, National Tractor and Implement Show of the West. Tractor and Implement Dealers' Ass'n of Southern California. Guy H. Hall, Mgr.

Sept. 27-Oct. 2—Buffalo, Closed Car Show, Buffalo Automotive Dealers' Ass'n, Elwood Music Hall, C. C. Proctor, Mgr.

Oct. 6-16—New York. Electrical Show. Grand Central Palace. George F. Parker. Manager.

Nov. 14-21—New York, Automobile Salon, Commodore Hotel Ballroom.

Nov. 15-20—Chicago, Automotive Equipment Show, Coliseum, Automotive Equipment Association.

Dec. 10-18—New York. Motor Boat Show. Grand Central Palace.

Jan. 8-15—New York. National Passenger Car Show, Grand Central Palace. Auspices of N.A.C.C.

Jan. 29-Feb. 4 — Chicago, National Passenger Car Show. Coliseum, Auspices of N.A.C.C.

Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.

FOREIGN SHOWS

Sept. 4-25 — London, Machine Tool and Engineering Exhibition, Machine Tool Trade Ass'n, Inc., Olympia.

October—London. Commercial Vehicle Show, Olympia.

Nov. 4-13—London, International Motor Exhibition, Society Motor Mfr's and Traders, Ltd., Olympia and White City.

Nov. 29-Dec. 4—London, Cycle and Motorcycle Show, Cycle and Motorcycle Mfr's and Traders Union, Ltd., Olympia.

Jan. 7 — Sydney, Australian Motor Show.

CONTESTS

Aug. 20-21—Middletown, N. Y. Dirt track.

Aug. 21—Elgin, Ill. Road race, Chicago Automobile Club.

Aug. 21—Johnstown City, Pa. Dirt track.

Aug. 28—Canandaigua, N. Y. Dirt track.

Aug. 27-8—Flemington, N. J. Dirt track.

Sept. 5 — Targa Florio Race. Sicily.

Sept. 6—Hornell, N. Y. Dirt track.

Sept. 6—Cincinnati, O. Speedway.

Sept. 6—Uniontown, Pa. Speedway.

Sept. 17-18—Syracuse, N. Y. Dirt track.

Sept. 25—Allentown, Pa. Dirt track.

Oct. 1-2—Trenton, N. J. Dirt track.

Oct. 8-9—Danbury, Conn. Dirt track.

CONVENTIONS

Sept. 1-3—Chicago. Thirteenth Annual Convention National Gas Engine Ass'n. Congress Hotel.

Sept. 16-17—Cleveland. Motor and Accessory Manufacturers' Ass'n. Credit Convention.

Oct. 11-13 — Chicago, National Association of Purchasing Agents' Annual Convention.

Jan. 11-13—S. A. E. Annual Meeting, New York City.

Gallaudet Biplane to Cross Continent

NEW YORK, Aug. 9—A new model biplane manufactured by the Gallaudet Aircraft Corp. and designed especially for commercial purposes will leave the Curtiss airdrome at Mineola this week for a demonstration flight across the continent. The machine has been carefully tested and its lifting capacity proved. Carrying a pay load of 1000 lb. and with its fuel tanks filled, it rose last week to an altitude of 15,000 feet.

The biplane can be used either for freight or passenger carrying purposes. The front cockpit will accommodate five persons and the one in the rear is equipped for two pilots. Every arrangement has been made for the comfort of passengers. Suit cases are fitted into the compartments to carry baggage. On the cockpit dashboard are thermos bottles and an electric cooker heated by the ignition system.

The main feature of the machine is the large body, which is of unusual width. The cargo hold is 6 ft. wide, 54 in. across and 54 in. deep. It is divided into four compartments. The rated speed is 115 m.p.h. and the landing speed from 40 to 50 miles. It is equipped with a 400 hp. Liberty motor.

On the transcontinental flight the Gallaudet machine will visit Washington, Dayton, Akron, Cleveland, Detroit, Chicago, Indianapolis, St. Louis and Kansas City. It will then fly into the Southwest and the route from there to the coast has not been determined.

MAKERS TAKE SHOW SPACES

SPRINGFIELD, MASS., Aug. 10—Tractors and other automotive farm and road machinery will be a feature, it is now indicated, of the Eastern States Exposition here Sept. 19-25. A new sales record in the history of the institution has been set in that the entire space in the exhibition building has been disposed of to manufacturers throughout the country. While a large number of local firms have engaged space, contracts have been made with concerns outside of New England for about one-half the total. Farm implements, many of them motor operated, will be given a place of prominence. Tractors, of a type especially adapted to New England farm and road work, are to be shown in quantity. Because of the unprecedented demand for space the management plans to house additional exhibits outside.

Delaware Demonstrates Economy of Tractors

WILMINGTON, DEL., Aug. 7—Farm tractors in operation contributed one of the chief features of interest at the annual "farmers' day" demonstration on the Delaware State Experiment Farm, at the State College, Newark, this week. Two of these machines, in the hands of experts, were put through various tasks to show their adaptability to farm work and the speed with which they accomplish these tasks, as compared with other forms of labor.

It is the aim of the station to not only instruct the students at the college, but also to disseminate the education among the older farmers of the state, showing results and how they are accomplished. In order to do this there is a "farmers' day" each year, when farmers from all over the state are invited to come to Newark. They are treated as guests, provided with refreshments, shown all over the place and given demonstrations in work that especially interests them. So this station is likely to do more than any other one agency in convincing the Delaware farmer that he needs the tractor if he wants to accomplish best results.

Aircraft Delegates Seek Credentials

WASHINGTON, Aug. 12—Uncertainty as to procedure required to allow American participation at the November meeting of the International Aircraft Standards Committee at Paris brought about an adjournment of an informal conference here Wednesday without definite action being taken as to appointments of American delegates.

The conference discussed the possible methods by which credentials could be obtained to permit formal recognition of American representatives.

The American aircraft industry has been placed upder considerable handicap through the failure of last Congress to enact legislation which would authorize expenditures of necessary appropriations and sanction the co-operation of the Federal Government and private enterprise in a common endeavor.

At the conference held in the offices of the National Advisory Committee on Aeronautics, the War, Navy, Postoffice and Commerce Departments were represented, as were various engineering organizations and manufacturers of aircraft. It was decided that an executive session was necessary to insure secrecy pending diplomatic negotiations.

Congress will not assemble until December, too late for the conference.

BLISS FINANCES PURCHASES

NEW YORK, Aug. 12—Stockholders of the E. W. Bliss Co., at a special meeting, have ratified the plan for readjustment of the capitalization by issue of additional stock. The company will raise $500,000 to meet initial payment upon purchase of the Cleveland Machine & Mfg. Co. of Cleveland, and the Buckeye Engineering Co. of Salem, Ohio. The company has the option of meeting the deferred payments through the issue and of Class A second preferred stock.